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**Prof. Dr.  
Sokol Abazi**  
Editor-in-Chief

Greetings!

Ladies and Gentlemen,

It is with great pleasure to welcome each and every one of you in formally introducing the journal release. The team has always been grateful for all the support we've received throughout the year. Before this year ends, we would like to recognize all the efforts that has been poured into publication so that this initiative would be possible.

The Editorial Board continues to pride in committing itself to quality by providing studies that are deemed to be relevant to the society. Together with all the members of team, we are delighted to share this semi-annual's publication, November Issue 2022. This journal's issue is primarily focused on key topics such as innovation, entrepreneurship, and business strategy. Over the past months, the team received numerous studies coming from various researchers in the field of economy and engineering. The team started collaborating and collecting journal articles in September and finished collating it last in November. Overall, the team received a total number of eight journal articles for this period alone. With that, the team would like to express its gratitude and thanks for all the efforts and contributions made by the researchers, editors, and other members of the team involved in the process.

By the start of next year, the team will continue to provide more complex and better scientific researchers in the field of economy and engineering. Moreover, the team's goal for issue is to attract more researchers exploring the field of digital economy, information engineering and technology, and internet of things. The team hopes for your continued support and patronage over the next months. With that, allow me to wish each and every one of your future success on your endeavors.

Thank you

**Prof. Dr. Sokol Abazi**  
Editor-in-Chief

## EDITORIAL

# MAIN CURRENT DATA SCIENCE AND ARTIFICIAL INTELLIGENCE ADVANCEMENTS AND CHALLENGES

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### ABSTRACT

Data Science and Artificial Intelligence play a major role in the nowadays fourth industrial revolution of Robotics, Artificial Intelligence and big Data. The purpose of this editorial is to identify the progress, the trends, the open problems and challenges of these research fields in a comprehensive way, so that an overview is provided that would help researchers and practitioners in their research and development orientations. A lot of research and development efforts since many years have brought Data Science and Artificial Intelligence in a good shape and level of maturity. These technologies have proved to be realizable in a wide range of real world applications with considerable success. Although the analytical theories they are based on are not all in mature level, however, their black box implementations have been very promising so far with real improvements in real world systems performance and usability. At this stage of development such an emergent revolution in all aspects of life demands a careful thinking to discriminate hype from real achievements. This is the major goal of this editorial, to start such a discussion since hype has been a serious obstacle, many times at the past, for real technological advancements. Filtering hype and revealing reality in these fields requires much effort and extensive studies in all application fields and it is not possible within this editorial. We plan more publications in depth regarding this issue. This editorial should be considered only as a first small step towards this goal. Starting from current major trends of Data Science and aspects of Artificial Intelligence

**Keywords:** Data Science, Artificial Intelligence, 4th Industrial revolution, Technology and Business Trends.

### MAIN DATA SCIENCE AND AI TRENDS

Data Science and especially Big data is no longer a new concept for businesses. It has become an integral part in the wheels of at least big corporate business, especially for companies that are confident in how they can use this data to drive strategic management insights. How such technologies are currently applied at SMEs (Small Medium Enterprises) is another discussion and needs extensive research and data collection to quantify the real progress. Data Science is where science meets AI. Despite the pandemic, the sector has experienced growth. According to Anaconda's platform state of Data Science 2021 report, only 37% of companies have reduced their investments in data science. Data science is one of the fastest growing areas in the technology industry. It is, also, transforming

the way we approach data and analytics, both at business and in our daily lives. In our investigation, towards discriminating hype and reality in Data Science and Artificial Intelligence it is important to start with their current trends now emerging as market needs and services. The most important data science trends and developments for the near future, based on analysis of reports coming from companies as well as research and development studies could be reported as follows:

#### 1. Cloud migration explosion of Corporate Business and management IT associated services and Transactions

In a recent study, 68% of big corporations Chief Information Officers (CIOS) graded that "moving

to public cloud/expanding private cloud” has been the top driver of IT investments since 2020. The majority of big enterprises have started or are in progress in preparing applications for migration of all their data transactions and services to the public clouds by packaging on-premises applications into cloud containers. This is due to cost considerations, chip scarcity, and the need for scalability Enterprises migrate online transaction processing systems, data warehouses, web applications, analytics, and ETL to the cloud and data centers. Regarding especially ETL, a modern and important data processing term, which stands for Extract, Transform and Load, is widely nowadays applied as a data integration process that combines data from multiple data sources into a single, consistent data store that is loaded into a data warehouse, data center or other target system mostly related to cloud services. Many organizations already have hybrid or multi-cloud deployments and the trend is to focus on porting, transforming and processing data and data analytics Such a trend offers them the possibility to easily migrate from one cloud service provider to another without worrying about holdups and safety issues or about realization of leveraging and expansion of specific point solutions and their services.

## **2. The exponential growth of predictive analytics as a service for business and governments**

Predictive analytics is worldwide grown very fast as a major trend in the market, business and governance. For instance, by analyzing data from currently over 100 million subscribers, Netflix uses precise data insights to influence more than 80% of the content users have access. Predictive analytics could be defined as the use of statistical and Machine Learning tools and techniques that leverage historical and existing data to forecast future trends. Predictive analytics enable organizations to make insightful business decisions that help them grow, manage strategically about how to plan and modify goals based on data-driven insights generated using this specific technology of data science. The global

predictive analytics market is expected to reach USD 21.5 billion by 2025, growing at a CAGR of 24.5%/. Such incredible growth projections come due to the adoption of digital transformation in corporate business and governance. In fact, Microsoft CEO Satya Nadella said, “In two months it seems the world of business has gone through two years of digital transformation.”

## **3. The fast growth of a new generation of platforms for expanded usability, scalability and fast applicability of Data Science and AI Methodologies in real world problems.**

AutoML and MLOps are the main frameworks with respect to the market trend and demand that Data Science and AI could be easily prototyped as products and services for solving real world problems. Automated machine learning (AutoML) is one of the latest trends driving the smooth worldwide use of data science. The largest part of a data scientist’s work is in data cleansing and preparation, what is called data preprocessing engineering and EDA (Exploratory Data Analysis) and each of these tasks is repetitive and timeconsuming. AutoML automates these tasks and includes model building, algorithm building, and Machine Learning in an easy way for usage and application. Python Libraries and platforms like LazyPredict library is an example of the successful application of this new concept and trend. Optimized solutions might be not investigated as the priority. The priorities in corporate business and chief information officers (CIO) applying Data Science consider most of all the fast and easy applicability of available methods and tools with demonstrable and management convincing results AutoML is basically the process of leveraging automation to apply ML models to real-world problems. AutoML frameworks help data scientists visualize data, understand models, and deploy models. Its main innovations are component preprocessing, model type selection and hyperparameter search used for hyperparameter optimization in order to achieve as best results as possible. Automatic optimization is highly preferred over fine tuning coming from laborious research and development

even if this automated optimization does not lead to the best possible results. On the other hand, MLOps mission is to deliver AI and Data Science products and services that create added value to business and governance by operationalizing Machine Learning and AI models making them ready to be used even by inexperienced personnel or novices. Related to MLOps and AutoML is, also, the trend of TinyML development and deployment, which is related to a type of Machine learning that scales down deep learning networks to fit any hardware. Its versatility, small form factor, and cost effectiveness make it one of the most exciting trends in data science and can be used to build a wide variety of applications. Embedding AI into tiny hardware solves the problems associated with embedded AI: performance and storage capacity. On-device machine learning is being or planned to be used everywhere. From building automation to medicine new developments and testing, it gives the ability to speed up iteration and development/testing cycles, to provide more feedback, and keep experimenting smooth and efficient. Areas of widespread application of TinyML are pattern recognition, speech analysis, and speech-human-machine interfaces. For instance, Voice analytics are currently in use regarding child and elderly care, device monitoring, production monitoring, surveillance and security monitoring. Besides speech, TinyML can also be used for vision, motion, and gesture, but, also, emotion and attitude recognition. According to McKinsey, there are over 250 billion embedded devices in operation worldwide today. TinyML can bridge the gap between edge hardware and device intelligence. With the advent of new human-machine interfaces, TinyML should incorporate AI and computing in a cheaper, scalable, predictable and much more manageable way. According again to McKinsey and other reports TinyML device shipments are expected to grow from just 15 million in 2020 to 2.5 billion by 2030.

#### **4. Rich Experience, Improved Augmented User Interfaces fast growth**

It is expected that in the near future there might be an AI agent in the form of an intelligent

interface that assists customers in all services offered them by the companies and governance. Even nowadays, instead of human operators, telecommunication companies for instance, use digital assistants. Imagine that the use of such assistants will be expanded to all kinds of services offered by companies, starting from shopping and going even to medical services. Customers will be assisted to buy products or services through rich experience Virtual Reality based interfaces implemented as intelligent robots or webots and getting better product or services ideas via audio or advanced consumer interfaces. Such expansion of consumer interfaces can take several forms. It could be a mobile AR or a communication interface or Brain Computer Interface (BCI) or even more sophisticated interfaces. New advanced consumer interfaces have started already to be present at metaverse, Facebook, Microsoft and other companies that are already part of this initiative for dramatic expansion of the experience and usability offered by consumer interfaces. Extended such consumer interfaces include IoT, VR, AR, BCI and AI. Speakers, AI agents, etc.

#### **5. Fast and widespread growth of Data Science and Artificial Intelligence usage and application as a Service (DSAIaaS)**

DSAIaaS (Data Science and AI as a Service) is related to the development of out-of-the-box Data Science and AI solutions that enable customers and users to implement and deploy them in scalable and efficient ways in real world problems. Recently, OpenAI announced that its Transformer language model, GPT-3, is planned to be universally applied as an API model for this purpose. DSAIaaS is one of the latest trends, deploying cutting-edge models for large scale improved services. Such a framework in the near future will be defined by integrating technologies characterized by well-defined, self-contained functions. For example, a manufacturing company could use such a model to create chatbots as separate services for internal conversations and inventory forecasting and control. The growing number of domain expert AI models has led to complex algorithms that provide specific



solutions that could be created on demand even for the most complex services now employing only human personnel. One of the biggest challenges that the framework of DSAIaaS is facing is how to meet compliance requirements customized for each individual case automatically. DSAIaaS will be a great way to build AI customized solutions quickly and at any scale needed. DSAIaaS market is expected to reach \$43.298 billion by 2026, and is expected to grow at a CAGR rate of 48.9% for the period 2021-2026, according to McKinsey reports DSAIaaS looks like being a very promising technology with a huge potential market for professional applications in real world problems. Conclusions and prospects Data Science includes both practical and theoretical application of ideas and use of techniques such as Big data, Predictive Analytics, Artificial Intelligence, Machine Learning, Automated Control and Management, AI Agents and Robotics etc. In this editorial we have tried to outline five of the most important data science trends and developments for the near future. Big data and data analytics market is expected to reach around \$421 billion by 2027 The field of data science is growing very fast and organizations as well as corporate businesses embrace its applications enthusiastically so that they are not kept behind competition. But this editorial is only the first step of a study the author plans for the near future in order to outline not only the trends in the field but, also, the main challenges and real performances in the application of the aforementioned technologies and systems, in an attempt to discriminate real progress from hype in the field.

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# DRIVING THE EU GREEN DEAL THROUGH INNOVATIVE UNIVERSITY CURRICULA ON CIRCULAR ECONOMY

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## ABSTRACT

Challenging the global warming and its social and economic consequences to the society, in January 2015, the General Assembly of UN, began the negotiation process on the post-2015 development agenda. The process culminated in the subsequent adoption of the 2030 Agenda for Sustainable Development, with 17 SDGs at its core, at the UN Sustainable Development Summit in September 2015. (UN, 25 September 2015). Driving solutions to these challenges the EU also launched the European Green Deal as part of its permanent actions to transform and reshape the model of economic development generating wellbeing's while tackling global warming consequences to the society and nature. The EU Green Deal is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. COM (2019). EU Green Deal includes climate action, deforestation, biodiversity protection and restoration, circular economy, critical materials and batteries, sustainable blue economy, international ocean governance, plastic pollution and green transition.

## EU GREEN DEAL AND THE CIRCULAR ECONOMY

One of the main focus of the EU Green Deal is Circular Economy. Circular Economy is a new format of doing economy using technological advancements. A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which, we keep resources in use for as long as possible, extracting the maximum value from them whilst in use, then recovering and reusing products and materials. Ellen MacArthur Foundation (2013;2015a). In a circular economy, growth comes from 'within', by increasing the value derived from existing economic structures, products, and materials. This major report quantifies the benefits for Europe – in terms of growth, household income, and environmental outcomes – of adopting a circular development path compared with our current linear one. (McKinsey Center for Business and Environment, 2020).

Achieving a climate neutral and circular econo-

my requires the full mobilization of industry. It takes 25 years – a generation – to transform an industrial sector and all the value chains. (UN, 2019). To be ready in 2050, decisions and actions need to be taken in the next five years. From 1970 to 2017, the annual global extraction of materials tripled and it continues to grow, posing a major global risk. About half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing of materials, fuels and food. The EU's industry has started the shift but still accounts for 20% of the EU's greenhouse gas emissions. It remains too 'linear', and dependent on a throughput of new materials extracted, traded and processed into goods. (Global Resources Outlook, 2019).

Studies show that in Europe, the Circular Economy can generate benefits of up to 1.8 trillion Euros by 2030. (Ellen MacArthur Foundation, 2019). Beyond these figures, the circular economy in Europe can contribute to facing the challenges of preserving natural resources, promote

innovation, take care of the environment and create employment. All these indicators can be articulated as indicators of growth for Europe and not only. OECD (2021).

The Circular Economy enables a model of economic development, according to which the continuously increasing fulfilment of the all-round needs of society does not exhaust the resources of nature, generates economic growth and care for the human and natural environment. The Rocky Mountain Institute estimated in the year 2000 that the flow of natural materials globally is 500 billion tons per year but only 1% is put into durable products and still there 6 months later, the other 99% is waste. (CB insights, 2001).

### **UNIVERSITIES AS CHANGE MAKERS TOWARD A CIRCULAR AND SUSTAINABLE MODEL OF DEVELOPMENT.**

The Canadian Institute of Technology EU Erasmus+ project "Inclusive Digital Education for Circular Economy" as a case study.

The mission of universities to transform and progress the society, economy and protect the nature is indispensable for the contemporary society. Challenging global warming, climate changes, poverty reduction, creating an equity, fair and a just society requires the particular power of universities, with their unlimited power of knowledge. The most advanced knowledges and knowhow coming from universities can illuminate the society and empower it to transform development models across all its levels in time and space. Universities can design and apply kits and delivering them to society and business in order to transform mindsets and models of development across all stakeholders and communities.

Curricula design and implementation across all levels of education is very crucial in this process. Through university curricula's and educational programs, students' benefits knowledges, acquire professional skills being able to implement them facing challenges in their social and professional life. A concrete model in this regard comes through the project "Inclusive Dig-

ital Education – a Tool to Understand Circular Economy" where CIT is partnering among other six academic and research institutions from EU countries. This project focuses on the topics of Circular Economy and circular business models that helps HEI's to implement digital education solution into their curricula. The project will develop an innovative, asymmetrical online course on Circular Economy and Green Business theme and it will strive to improve digital pedagogical competences of educators, enabling them to deliver high quality interactive digital education. The project will achieve the above listed overall results in different ways. It will develop an E-Learning Course "DiGiTOOL toCE" consisting of 5(five) modules, for circular economy and circular business models. It will be asymmetric online course, which will be executable completely independently from the lecturers within set deadlines. Asymmetric online courses will bring potential advantages to students such as, flexibility to study in time and place which is for them the most appropriate, especially important in cases when students do not have access to internet, necessary hardware or free private room) while they set the most appropriate pace of the learning - one can go through and review materials as much as need to. Quick learners can power through materials and units quickly and use time for other reasons, if it takes for somebody longer to absorb new knowledge, one can review information, take notes, and practice retention without worrying about falling behind classmates or missing key points in a lecture. In this situation this model of curricula's design goes in line with EU policies and strategy growth for smart, sustainable and inclusive growth. (EU strategy growth, 2022).

E-course will be developed with modern authoring tool (e.g., Adobe Captivate or similar) which are covered with creative and catching templates that are supported with several Learning Management Systems (e.g. Moodle or html) and supports SCORM (tracks, for example, how did students answered to quizzes and tests, did the user really took the whole eLearning course, how much time it took, etc. which are important

factors to become an elective course and receive ECTS credit points.

The project will develop an electronic tutorial “DiGi MENTOR” of how to plan, develop and run asymmetric courses in Higher Education institutions (like DiGiTOOL to CE”). This tutorial itself will be as an e-learning module and will strive to improve digital pedagogical competences of educators, enabling them to deliver high quality interactive digital education. In development of this tutorial, partners will consider all the experience they will have while developing e-learning modules for CE course. Direct target groups of the project will be students of higher education institutions, educators of the higher education institutions of business, economy and finance fields. The project will support “EU Digital Skills & Jobs” policy, Digital Education Action Plan (2021-2027) and by including topics of CE in the E-learning, it will help to forward EU to its set objective in “Green Deal” to be the first continent, that becomes environmentally neutral by year 2050. The project will lay under Horizontal priorities “Innovative practices in a digital era”, “Environmental and Climate Goals” and in Higher Education sector “Promoting and rewarding excellence in teaching and skills development”. Developed E-Course in Circular economy (CE) will rise awareness about environmental and climate change challenges. Circular economy promotes the environmentally friendly and responsible production of products, reasonable and responsible consumption and purchase of products that do not increase number of the waste. Whole modules of the study course are dedicated to specific CE issues promoting sustainability and waste reduction. In response to environmental challenges, the circular economy (CE) is an essential new concept and will revolutionary change the existing business. The importance of CE is stressed by: - UN Sustainable development goals 2030, EU Green Deal strategy (EC, 2019) aiming to transform EU into a fair and prosperous society, with a resource-efficient, competitive economy with no emissions of greenhouse gases and where economic growth is decoupled from resource use, CE Action Plan (EC, 2020)

calls for immediate actions to accelerate circularity on whole EU, requiring multi-level collaboration, radical changes of business education and mindset of entrepreneurs and other beneficial impacts.

Project aims at developing competences in various sustainability and environment friendly relevant sectors, developing green sectorial skills strategies and methodologies of Circular Economy. CE models promote environmentally friendly production & consumption and by development of the E-Course better explains these aspects to ensure the circularity and sustainability, in thus it will also better explain Environmental issues. Society in general, lack the understanding about CE and this project will improve this knowledge and understanding. The study course will be designed not just provide a knowledge, but also specific skills that change behaviour towards more sustainable and environmentally friendly thinking. Based on the most advanced knowledge coming from EU academic and research institutions, CIT is offering digital skills on Circular Economy beyond university auditoriums through extracurricular programs. As a direct impact of this EU Erasmus+ project, an interactive digital platform is designed and established in order to deliver digital knowledge and certified skills on circular economy in an open and free mode to all interested communities(<http://www.edu-csace.com>).

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# ALTERNATIVE FINANCE. IT IS TIME TO REDEFINE CAPITALISM

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Recently, there is an ongoing increased interest for the notion of Alternative Finance. It is a new concept, but it is becoming widely accepted from the market participants, especially in the financial market. Alternative Finance was first introduced after the financial crisis of 2008. Apparently, it was thought to be a choice for the problems that the financial crisis caused. Many studies were conducted about the Alternative Finance, showing interesting results about it. Nowadays, more and more countries are using it in parallel with conventional finance. A special part of Alternative Finance is the Islamic Banking. It has a different way of operating from conventional Banking. The bank products are designed to fit a mutual incorporation with shared profits and risks, differing from those of conventional banks. They help their customers by financing their purchases or entering into different investing contracts to make profits.

Considering that it has been a trend recently in almost all the countries, many researchers have intended to further shed light on the idea of Alternative Finance. According to Schoon (2009) the industry of the Alternative Finance has been growing rapidly after the 2000s, while Siddiqui (2014) asserts that it is an industry of trillion dollars with several financial institutions participating. Scholars provide evidence for the expansion of the industry of Alternative Finance, revealing that its strong position in cash is the prevailing factor for its growth. They highlight the fact that many investment funds have adopted this way of making business as their framework of an ethical behaviour.

As far as the banks' capital adequacy is concerned, the studies question the rationale for Alternative banks to have restricted regulation for their capital requirements. The capital requirements should address the issue of liquidity risk for Islamic banks. Those need less capital requirements than conventional banks, since they act as

agents on behalf of their depositors who rely on the trustworthiness of the banks' investment decisions in order to collect their money back.

## ALTERNATIVE FINANCE FRAMEWORK

Alternative Finance is a way of making financial transactions, based on five principles which are:

1. Disuse of interest. According to the Alternative Finance the financial institution as well as other financial agents undertake money transactions with no interest included. The legitimacy under this principle is that the money itself must not generate money. It is believed that this restriction will eventually bring a more efficient allocation of funds and a more profitable use of them.
2. Profit/Loss sharing principle. According to this principle, all the parties in a contract/transaction must share the profits as well as the losses incurred by an investment. This is done by a pre-determined ratio, agreed by all parties. It is much fairer for all, either if the investment results in profits or in losses and no injustice exists.
3. Asset backed transaction principle. The transactions or contracts between parties involved must be based on an underlying asset, which must be real and tangible.
4. Avoidance of uncertainty. This principle does not mean that the investment must not be risky at all. In the financial framework everything is risky and we cannot eliminate it. The meaning is that it must not have uncertainty in the terms of the contract arranged between parties.

### **ALTERNATIVE FINANCE VS. CAPITALISM**

The core of capitalism is the free market economy represented by market forces. The match between the demand and supply is the equilibrium supposed to manifest this free will. However, these forces of capitalism are really put in question. Does it really promote free markets? Can the customers and the employees really express their free will? As most of the capital is accumulated on the hands of a minority, it is a driving force for uncontrolled profits which provide a monopoly system. The monopoly unless, freezing the market forces, will at list inhibit their natural functioning. As such, it is the capitalism pretending to promote the free market, which indeed destroys the natural process of the demand and supply. Alternative finance on the other hand promotes the free market and the law of the demand and supply. The only difference is that this system puts some limits on the operations of the free market. As everyone is free to join the market whether by demand or supply, and the equilibrium is again put on their match, the price that everybody should put on the something of value that he offers, has got some limits. Nobody can enter in a market with a very high profit margin by affecting the demand and supply as well as artificially increasing the price of the commodity. This arbitrary price does not represent the real value of the commodity; as such it creates a bubble which at explosion inevitably creates paralysis in the economy.

One of the main elements of the capitalism today is the use of the interest. The interest is thought to be the price of the money. As such, it reproduces money by the use of money itself. This technique is indeed the most dangerous one. First, it provides no added value in the economy. Second, it is not fair for the saver of the money. Moreover, this process provides a domino effect. As the borrower fails to pay the high interest put by the lender, he/she will acquire additional credits, over which he will pay additional interest. As such the risk of interest rate will continue to spread over all the lenders until making them fail. This is indeed what happened in the crisis of 2008.

Talking about justice, this scheme is unjust for the savers. In capitalism, the banks are the institutions which run this process. They give money to those who need them in return for the interest. First, the banks are not the owners of the money, so they are lending something that they do not own; rather they take in by individuals who might even put it in deposits for their future use. Such funds are used by the capitalists for further increasing their capital. So, they invest in profitable investment opportunities which might provide them huge rate of return. Compared to the rate that the bank turns to these individuals, there is a huge difference. As such, the capitalist exploits those individuals savers to whom it only gives a small proportion of his enormous profit.

The Alternative Finance proposes disuse of interest in lending. Money is only used as a means of exchange. Moreover, the bank enters in an investment as a partner with the entrepreneur. They put on this partnership complementary elements which make it possible the functioning of the business. The return derived by this partnership is then shared among parties according to their agreement. This form of the partnership might also work between many savers who put their money in the bank, and the entrepreneur. The bank in this case works as an intermediary. The profits realized by the partnership should be distributed among all the savers who invest the money in there and the ones who invest the effort.

Another important element in this analysis is the risk. The capitalist who undertakes an investment does not share the risk of this investment with the bank; neither does he share it with the savers who have put their money in the bank. As the capitalist asks for funds in the bank, it imposes an interest rate, based on the market, regardless of the amount of profit that he will generate on this investment. As such, the interest rate is predetermined while the rate of return is not sure yet. In case that the investment fails, the investor should bear all of the risk by himself. The bank or the savers will still take their rate of interest which in this case is lower than the total loss of the investor. As such this scheme is unfair for the investor as well.

According to the Alternative Economy there is no predetermined rate for the money rented to the entrepreneur. There is indeed an agreement between the provider of the funds and the entrepreneur to share every profit that the partnership will generate. As such both of them are partners regardless of what they invest in the common business. Moreover, even if the investment fails, the loss will not be totally bore by the investor. All the parties implemented in the investment will share part of this loss. This is the concept of the risk share promoted by the Alternative Finance. It is fair enough to treat all the parties equal and to avoid unfairness.

Karl Marx said “Capitalism will destroy the ones who invented it”. Apparently, it is time to think of Alternative Finance as a way for redefining the roots of capitalism which has had the greatest impact on the history of Economy.

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# ON AUTOMATING NETWORK SYSTEMS CONFIGURATION MANAGEMENT

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## ABSTRACT

In nowadays, communications are expanding in very high rates. New technologies are being born and some of them are taking so much importance in people's lives. In a situation where people's needs are getting more complicated and everybody's lifestyle is advancing to another level, bigger and better infrastructure is needed. Managing all this process can't be anymore a step by step process. It is strictly needed to evolve in automated process. Network configuration and reconfiguration may be a repetitive process, time consuming, and error prone process. To address this problem this paper is going to shed light on the benefits of an automated configuration and topology verification process. To this end, a proof of concept system, Netmiko, has been used in a case study. Netmiko scripts are able to read the current network state, can apply predefined configurations loaded from text-files or csv files, and automatically verify the network state. The goals of this paper are to demonstrate the development of Netmiko scripts, to illustrate the simplicity in the implementation, to compare the automated network system reconfiguration to a fully manual one, and, finally, to discuss potential pros and cons in switching to an automated network configuration process in everyday practice. A simple Packet Tracer simulation in joint with a GNS3 simulation are involved to evaluate this proof of concept. In Packet tracer a manual network configuration is performed while in GNS3 an automated network configuration is developed.

**Keywords:** network configuration management, automated configuration management, computer networks, packet tracer, GNS3 , Cisco IOS XR, Python, Netmiko Library

## INTRODUCTION

In the area of network communications, automation is related to the configuration of network devices and components that realize the communication between different users and services (Red Hat and Sisay Tadesse, Claire Naiga Serugunda Fabrizio Granelli et. al. (2021)). This is challenging, difficult and requires hard work, because not only one needs to verify the configuration of a device, but also the entire network component configuration that results the connection of all the devices together. When working with automated network configuration tools or scripts it is therefore, important to detect bugs in the software, that may lead to delays in committed configurations.

Many network automation engineers have stated that today's systems must be able to detect errors and must be able to auto-correct

themselves in a way that they restore the system's stability. To detect such changes or deviations, automation capabilities include the concept of

knowing and understanding of a "steady state" where the system fulfills the requirements of a system in health.

A steady state requires that firstly the interfaces and ports must be properly configured, desired protocols are enabled and properly configured on devices and the desired function in a correct way.

This could be done in many ways, but the main most used ones are: (i) return the device configuration to previous configuration, (ii) correct, or smartly correct the actual configuration and restore the "steady state" of the device so that it may connect successfully to the rest of the network and complete correctly all of its assigned tasks.

The goal of this paper is to: use and evaluate a tool that automates network configuration, compares the automated process to a completely manual network configuration with regards to factors, like time and costs, and discuss potential benefits or problems in a manual network configuration transition to an automatic network configuration. The proposed automated network configuration scripts should be easy to implement, should be able to generate accurate network desired configurations, and should be easily understandable. The aim of this paper is to obviously state the potential pros and cons in automating network configurations processes.

## 1. CHALLENGES

The number of possible states that appear in real networks is huge, and it is hard to predict and handle all these states in advance and mitigate actions for the future (Sisay Tadesse, Claire Naiga Serugunda Fabrizio Granelli et. al. (2021)). Verification of the correctness of network automation processes is required, hence their systematic execution appears to be a big challenge. First, the large number of devices in a real environment that need to be configured might affect the time required to configure the entire network. Second, the type of each device for example: CISCO, Juniper, Fortinet, Checkpoint, affects the design and implementation of the automation process. For example, if the automated tool has to support a wide range of devices such as Cisco, Juniper, HP, Alcatel- Lucent, and Aruba, it affects the implementation effort, time and labor needed to be spent to make the whole schema workable. Third, the scripts may be prone to bugs which need to be fixed, a time-consuming task, almost always need efficiency improvements, and there is always the need to make sure that they can be adapted for many other network configuration cases. Fourth, the type of configuration that needs to be managed on the devices also affects the completion time of the configuration process, because not all protocols have the same converging time.

## 2. TECHNICAL BACKGROUND AND TOOLS HIERARCHY NEEDED FOR NETWORK CONFIGURATION MANAGEMENT

Remote administration is beneficial while seeking to facilitate communications to devices and gadgets which can be geographically distant, especially when having to acquire access to many devices without delay, not having to attach via cable every tool and device (Jason Edelman, Scott S. Lowe, Matt Oswalt (2018)). A CLI interface (Command Line Interface) might be a way of interacting with PC systems, like Operating Systems (OS) and networks. Common protocols used for CLI based total network management are for example Telnet and SSH which both allow far from access to community devices. Telnet runs on pinnacle of the connection orientated Transmission Control Protocol (TCP) while speaking with far flung devices and presents more reliable communication than a connectionless protocol, like User Datagram Protocol. To manage Telnet limitations, the SSH protocol is one of the various foremost recognized protocols for stable remote community services over an insecure community, supplying encryption, cryptographic host authentication, and integrity protection. A device is accessed through a remotely located procedure via a stable channel provided by using the SSH protocol. Like Telnet, SSH runs on top of TCP, however with security measurements providing a secure connection for tool management over an insecure community, like the internet. Basic issues involved in the herein planned remote control for network configuration management are

- Accessing SSH terminals with paramiko
- Transferring files thru SFTP
- Transferring documents with the help of FTP

In the proposed herein project for automated network configuration management several third party packages, like paramiko, pysnmp, and so on are involved, to facilitate developments using as a platform secure shell python. (Eric Chou, Abhishek Ratan, Pradeeban Kathiravelu (2019), M. O. Faruque Sarker, Sam Washington ( 2015) , José Manuel Ortega (2018) , Kirk Byers (2016))

SSH presents an exquisite encrypted communications among sender and receiver , so unrelated third-events can't see the

content material of the info in the course of the transmission medium. Details of the SSH protocol are regularly discovered in these RFC documents: RFC4251-RFC4254, obtainable at <http://www.Rfc-editor.Org/rfc/rfc4251.Txt>.

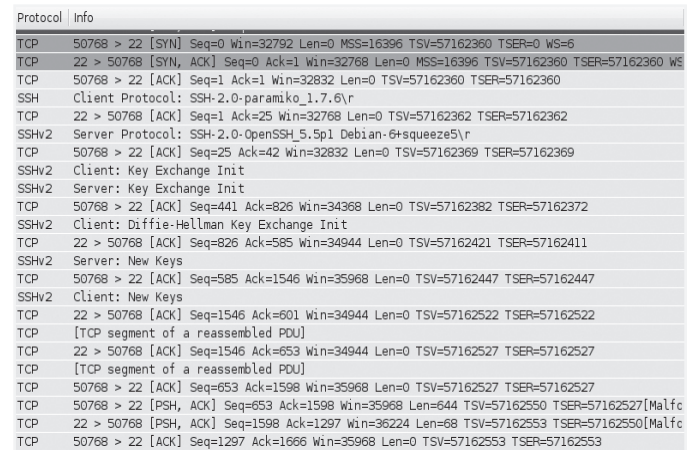
Python's paramiko library affords a clever support for the SSH-primarily based network communication. Python scripts could be used to investigate the benefits of SSH-based remote administration, just like the remote command-line login, command execution, and consequently the extraordinary steady community offerings among networked computers. (<https://pypi.Python.Org pypi/pysftp/>)

The SSH may be used as a client/server protocol where each of the parties use the SSH key pairs to setup the communication link. Each key pair has one private and one public key, as known in PKI infrastructures. The SSH public and private keys are regularly generated and digitally signed via an outside or an inside certificates authority, but this brings big overheads to a little enterprise. So, instead, the keys are frequently generated haphazardly via software tools, like ssh-keygen. The general public key should be available to all or any participating parties. As soon as the SSH patron connects to the server for the first time, it registers the general public key of the server on a special file acknowledged as `~/.Ssh/known_hosts`. Of course, if you re-build the machines, just like the server device, then the old public key of the server might not in shape thereupon of the one stored within the `~/.Ssh/known_hosts` report. So, the SSH client will issue an exception and stop from connection.

We can use the paramiko module to make an SSH patron and connect it to the SSH server. This module will supply the SSHClient() elegance. The instance of this client will robotically reject the unknown host keys. So, the user will be capable of initiating a coverage for accepting the unknown host keys. The built-in AutoAddPolicy() method will add the host keys as soon as they are discovered. In the sequel the user could employ the `set_missing_host_key_policy()` technique collectively with the subsequent argument at the `ssh_client` object as follows, `Ssh_client.Set_missing_host_key_policy(paramiko.AutoAddPolicy())`. It is additionally possible to

add the device host keys by means of the use of the `load_system_host_keys()` approach.

It might be very interesting to intercept the network packets change among the client and the server. To this end we could use many commands but it's easy to use both the local `tcpdump` command and the Wireshark tool to capture network packets. With `tcpdump`, we'll be capable of specifying the target network interface (`-i lo`) and also the port (port 22) options. within the following packet exchange session, where 5 packet exchanges are shown during an SSH client/server conversation, as captured, also, through Wireshark in the following screenshot:



| Protocol | Info  |
|----------|---|
| TCP      | 50768 > 22 [SYN] Seq=0 Win=32792 Len=0 MSS=16396 TSV=57162360 TSER=0 WS=6                 |
| TCP      | 22 > 50768 [SYN, ACK] Seq=0 Ack=1 Win=32768 Len=0 MSS=16396 TSV=57162360 TSER=57162360 WS |
| TCP      | 50768 > 22 [ACK] Seq=1 Ack=1 Win=32832 Len=0 TSV=57162360 TSER=57162360                   |
| SSH      | Client Protocol: SSH-2.0:paramiko_1.7.6\r   |
| TCP      | 22 > 50768 [ACK] Seq=1 Ack=25 Win=32768 Len=0 TSV=57162362 TSER=57162362                  |
| SSHv2    | Server Protocol: SSH-2.0:OpenSSH_5.5p1 Debian-6+squeeze5\r                                |
| TCP      | 50768 > 22 [ACK] Seq=25 Ack=42 Win=32832 Len=0 TSV=57162369 TSER=57162369                 |
| SSHv2    | Client: Key Exchange Init   |
| SSHv2    | Server: Key Exchange Init   |
| TCP      | 50768 > 22 [ACK] Seq=441 Ack=826 Win=34368 Len=0 TSV=57162382 TSER=57162372               |
| SSHv2    | Client: Diffie-Hellman Key Exchange Init  |
| TCP      | 22 > 50768 [ACK] Seq=826 Ack=585 Win=34944 Len=0 TSV=57162421 TSER=57162411               |
| SSHv2    | Server: New Keys  |
| TCP      | 50768 > 22 [ACK] Seq=585 Ack=1546 Win=35968 Len=0 TSV=57162447 TSER=57162447              |
| SSHv2    | Client: New Keys  |
| TCP      | 22 > 50768 [ACK] Seq=1546 Ack=601 Win=34944 Len=0 TSV=57162522 TSER=57162522              |
| TCP      | [TCP segment of a reassembled PDU]  |
| TCP      | 22 > 50768 [ACK] Seq=1546 Ack=653 Win=34944 Len=0 TSV=57162527 TSER=57162527              |
| TCP      | [TCP segment of a reassembled PDU]  |
| TCP      | 50768 > 22 [ACK] Seq=653 Ack=1598 Win=35968 Len=0 TSV=57162527 TSER=57162527              |
| TCP      | 50768 > 22 [PSH, ACK] Seq=653 Ack=1598 Win=35968 Len=644 TSV=57162550 TSER=57162527[Malfc |
| TCP      | 22 > 50768 [PSH, ACK] Seq=1598 Ack=1297 Win=36224 Len=68 TSV=57162553 TSER=57162550[Malfc |
| TCP      | 50768 > 22 [ACK] Seq=1297 Ack=1666 Win=35968 Len=0 TSV=57162553 TSER=57162553             |

Figure 1. Inspecting Packets

After completion of the TCP handshake session, the SSH packets that follow negotiate the relationship between the client and the server and determine how the client and the server negotiate the encryption protocols. During this example, the client port is #50768 and the server port is #22.

Apart for SSH protocol, the tools needed to manage this development project include, additionally, involvement of the Cisco IOS® software. Cisco IOS is a multitasking software bundle for Cisco-primarily based community elements that provides services, like routing, switching, internetworking, and specific telecommunications features. consistent with Cisco. IOS is presently working on numerous active Cisco devices, making it the maximum universally leveraged community infrastructure software application, offering a set of commands to configure Cisco devices. Cisco IOS presents excellent configuration modes for various user

privileges. For international configuration mode allows input of instructions with the flexibility to alternate the device configurations, while the setup mode permits the configuration of greater unique features, like interfaces and protocols, in an interactive way (request-reply). Cisco network elements may additionally even be configured via loading a data document with configurations immediately into the tool, instead of having to input the complete configuration in the kind of instructions. Based on Cisco IOS the OSPF routing protocol in networking topologies between Cisco devices can be easily configured.

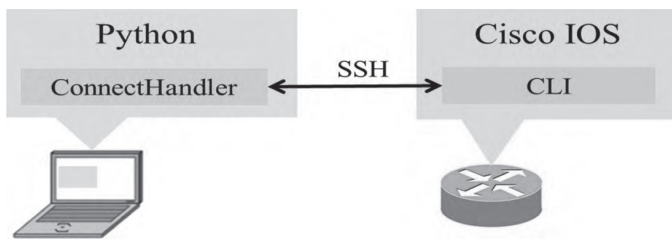
Cisco IOS XR is a detail of the Cisco IOS family that is made for building modular, and allotted middle routers. Such routers are typically positioned within the center or fringe of a backbone service company network wherein more robust solutions of device mirroring are required. The modularity is shown into the memory control wherein IOS XR has protected memory safety between processes, while routing policies run in separate memory space. A crashed BGP method will therefore no longer affect a parallel OSPF way, consequently developing a facilitating context for the multiple devices manipulation that the central network of an ISP requires. Additional functions supported thru IOS XR are hardware redundancy support, packet based software program distribution version, and optional functions, permitting multicast routing and Multiprotocol Label Switching (MPLS) to be configured at the same time the router is even in commission, without interrupting any functionality.

In IOS, the modifications you create to the configuration of the networking devices are carried out at once. IOS XR based devices have to be committed (the use of the dedicate command) in advance before being implemented. Syntax could include commands for defining characteristic abilities, as can be visible in Table 1 below, in which common capabilities are indexed and defined. The commits are saved regionally within the tool, together with an autogenerated devote ID, and can be displayed whilst strolling the configuration commands listing. The commits in the database involve rollback points, permitting preceding configurations to be activated all over again with the rollback command.

Table 1 - Basic BGP configuration for Cisco IOS routers and Cisco IOS XR.

| Cisco IOS (Router ID: 192.168.1.5)  | Cisco IOS XR (Router ID: 192.168.1.8)  |
|---|--|
| <pre>router bgp 3402 no synchronization bgp log-neighbor-changes neighbor 192.168.1.8 remote- as 3402 neighbor 192.168.1.8 update- source Loopback0 no auto-summary end</pre> | <pre>!! IOS XR Configuration 5.3.3 router bgp 3402 neighbor 192.168.1.5 remote-as 3402 update-source Loopback0 ! ! End</pre> |

The architecture and hierarch of tools needed to implement the aforementioned problem of automated network configuration management includes, moreover Python scripting. Python is a multi-functional programming language. Python gives high-degree syntax that permits programmers to precise standards in fewer traces of code than is viable with other programming languages like Java. The power of Python relies on the efficient use of its specialized libraries with minimal effort using very short scripting commands. The library used herein is Netmiko. Python provides the Netmiko library, which simplifies SSH manipulation of network devices (Kirk Byers (2016) Linux Journal, Packet Hub, Learning Oreilly), returns a rich text output to the developer, permitting him to pay attention on the configuration of the device in place in terms of low- degree SSH details. Netmiko supports more than one framework including a large set of Cisco frameworks, HP and Juniper ones. From the Netmiko library, a set of factory capabilities are regularly imported, one being the ConnectHandler class selecting the right Netmiko class based upon the tool specified and being a library typical to devices from multiple companies. The following figure shows an example on a way to use the Netmiko library to open an SSH connection at the Cisco IOS tool and verify the connectivity thru sending a command to spark off the variety of active interfaces at the device, and for that reason verifying connectivity with back output. As depicted in the following Listing of fig. 2, the ConnectHandler needs the tool type as an input, which in its familiar way, is regularly set to an large variety of devices from vendors, like Cisco IOS, Cisco IOS XR, Juniper, HP and Huawei.



```
[1] >>>net_connect=ConnectHandler(device_
type=' cisco_ios',ip='10.10.10.227'
,
username='pyclass',password='psw')
[2] >>>net_connect.send_command("show-
ipintbrief")
[3]
```

Figure 2. SSH using Netmiko connection to a device, via Python interpreter .

```
device = IOSXR( hostname=' . 1 0 . 1 0 . 1 0 . 2 2 7
', username=' *** ', password= ' *** ', port = ' 22
', timeout =120)
device . open()
device.load_candidate_config(filename='/
path/..) device.compare_replace_config()
device . commit_replace_config( l a b e l=' a r b i t
r a r y l a b e l ' )
```

Figure 3. Connecting to Cisco IOS XR, via Python interpreter

The ConnectHandler opens and keeps the SSH session with the CLI tool. Moreover, the pyIOSXR library is specialized to facilitate the communication with Cisco IOS XR devices, thru using an Extensible Markup Language (XML) agent. XML, being a framework and community meta language, facilitates the sharing of information among the Cisco IOS XR factors and the Python language. The XML agent permits for exclusive processes of sending instructions to devices, enabling commands, as proven in Listing fig. 3, wherein the script first opens an SSH connection to device, sets up the relationship within the device variables (line one), after which enters XML mode for the execution of the additional commands. The commands in Listing fig. 3 first ensure that the communication channel is open (line two), that a target configuration from a specified route is setup (line 3), comparing this to other configurations of the device (line 4), and finally committing the new configuration with the device (line 5), keeping the specific parts and replacing only the configurations that are not

possible.

As depicted in the Figure 4, the messages exchange session remains channeled via the lively SSH connection,

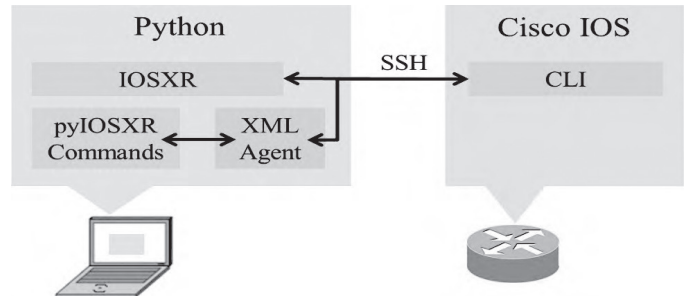


Figure 4. SSH connection to a Cisco IOS XR

to the device CLI, but the XML agent enables the process development. Note that the CLI manages the exchange session with the actual tool, as defined above. For instance, the device.Commit\_replace\_config(label='labelname') method corresponds to the fusion of the dedicate replace and devote label labelname. Cisco command noted in the IOSXR framework corresponds to the ConnectHandler feature used inside the Netmiko library. The Netmiko and pyIOSXR connection Handlers both lock the device under the entire connection, assuring that no configuration adjustments, by means of every other person, is merged into the devote class.

Within this object oriented framework, involved in defining the hierarchy and architecture of the system of tools for automated network configuration management, JavaScript Object notation (JSON) plays a significant role too. JSON is a compact, textual content, language independent, layout used for statistical analysis of transactions, which can be written manually or as an instance generated from a Java object. JSON permits for dependent facts sets management, just like XML, and is considered to be simpler to apply than its noted alternatives. This concept is primarily based on that in JSON shorter syntax is used with a simplified utilization of tags, which makes it faster to realize and develop. With regards to Python, the JSON library may be imported, permitting parsing between documents in JSON layout together with a Python dictionary or listing.

### 3. RELATED WORK AND TECHNOLOGIES IN AUTOMATING NETWORK CONFIGURATION MANAGEMENT

Netmiko is used to establish SSH connections to the devices and confirm that the connections have been setup properly. The devices have been stored in Python dictionaries corresponding to a community tool. The script that applied all above instructions, for a simple network topology, consisted of 93 lines of code and required approximately 46 seconds to execute Cisco IOS XR devices configuration as it will be demonstrated in the next sections. Through this computerized manner, decreasing tedious work in repetitive protocol configurations is made possible. If it is evolved and made everyday practice, for general and non vendor specific networking solutions, such scripting could serve as a completely automatic BGP configuration machine. Several technologies and protocols are herein evolved and are presented in the sequel.

#### 3.1 DYNAMIC HOST CONFIGURATION PROTOCOL

Dynamic Host Configuration Protocol (DHCP) is a community (network) protocol used to offer network configurations to community elements with the aid of allocating IP addresses in an automatic fashion. Consequently, IP addresses will not be manually configured on community devices inclusive of workstations, printers, game consoles, and private computers. The automatically dispensed IP addresses are selected from a pool of addresses, set with the aid of the server administrator and assigned to the clients thru the DHCP scheme. The client declares its presence inside the community through broadcasting a Discovery message. The server sends returned an Offer of an IP address and the client responds by way of sending a Request to hold the address. The address is taken in use by the client first when receiving the Acknowledge message dispatched via the server, ensuring that no other device inside the network has claimed the deal with. The purpose of the protocol is to deliver all configuration statistics needed, for a computer or network device, to access the community. This computerized host

configuration provides dependable IP addresses coping with configuration, hence minimizing the occurrence of configuration mistakes inclusive of typographical errors.

The data supplied by DHCP is IP addresses, subnet mask, default gateway etc. The most effective information to be given dynamically is the IP address deal with the remaining facts nonetheless needed to be manually configured on the DHCP servers. If the guide configuration contains faulty records, allotted to all of the community elements, the devices will no longer be able to communicate. For instance, if incorrect IP address is given to a host by means of the DHCP server, the host will be no longer capable of resolving DNS names due to the use of wrong DNS servers, hence the host will not be able to reach the ideal IP addresses.

Due to a centralized and automated TCP and IP configuration, and the handling of modifications for mobile devices, such as portable non-public computers, DHCP reduces community administration. This dynamic protocol is yet another instance of automated community configuration that reduces manual management and errors through the tedious but statically assigning IP addresses process.

#### 3.2 NETWORK CONFIGURATION PROTOCOL

In the early 21st century, it became clear that the Simple Network Management Protocol (SNMP), was used for monitoring networks mainly than for managing them. The Internet Architecture Board and Members of the Internet Engineering Task Force (IETF) found that the network control changed through CLI scripting, which became, as noted, restricted in dependent error management, transaction management and susceptible to changeable syntax of instructions. The Network Configuration Protocol (NETCONF), was developed to address the shortcomings of existing approaches, imparting exclusive mechanisms to simplify the installation, manipulation and deletion of configuration on community devices, as compared to SNMP.

NETCONF uses Remote Procedure Calls (RPC) to permit a network administrator to change

network configuration facts with the managed devices. The RPC based totally on messages exchange model works in a request-reply way using XML, supplying the NETCONF protocol with transport protocol unbiased framing, and the usage of elements for the communication between the client and the server.

The NETCONF protocol transactions allow error handling of incomplete configurations that the Cisco specific, non transactional approach does no longer offer. In a Cisco-unique method, inclusive of the OSPF configuration, an incomplete configuration will not be defined as a mistake, but as an alternative and the device will wait for extra instructions to finish the configuration. In a transaction primarily based communication, the inadequate configuration may be described as an error and comments will be provided to the administrator that the protocol isn't properly configured. Thus, a transaction primarily based framework will enable the network manager to recognize the management of the services within the network, as opposed to the management of devices configurations. Provided that a Cisco device involves the NETCONF protocol, a Cisco-unique technique and NETCONF approach can be used collectively, so long as the configurations aren't contradictory.

### **3.3 SOFTWARE-DEFINED NETWORKING**

Software-Defined Networking (SDN) is a modern approach to manipulate and control networks, using suitable software systems by abstracting network and networking devices performance statistics and managing all network factors. In SDN, the manipulating planes of all community factors are managed through a logically centralized SDN controller, permitting configurations of big area networks to be driven by managing network factors in order to easily integrate, as an example, new network services. The SDN controller communicates as a network backbone with all the devices, accordingly creating a control plane in the network wherein all the devices may be managed through it.

There are specific software system standards adapted for the management of the abstracted

planes of an SDN, as an example including NETCONF and OpenFlow, which provides the capability for unique OpenFlow enabled Switches to be controlled or updated centrally and for that reason shaping an integral SDN. McKeown et al. (McKeown et al.2008) defines an OpenFlow Switch as consisting of at least three components: "(1) A Flow Table, with a specific action related to each entry, to inform the switch the way to process the system component, (2) A Secure Channel that connects the transfer of control commands to an overseas control technique (known as the controller), allowing instructions and packets to be dispatched among a controller and the relevant switch. (3) The OpenFlow Protocol that offers an open and preferred way for a controller to talk with a transfer." McKeown emphasizes that through specifying the protocol in which entries within the Flow Table are manipulated and defined exactly, then, the switch itself does not have to be programmed and configured and this can be easily managed via the protocol.

Further, McKeown draws the belief that: "OpenFlow may be a realistic compromise that permits researchers to run experiments on heterogeneous switches and routers in the course of a uniform way, without setting the requirement for providers to expose the internal workings of their merchandise, or for researchers to code and install vendor-unique manipulation software". This statement regarding OpenFlow type protocols implies clearly the facilitation of network configurations on the basis of a uniformly defined network, but, additionally, implies the significance of the investigation for uniform network configurations despite integration of vendor-specific networking factors.

### **4. A PROPOSED METHODOLOGY FOR AUTOMATED NETWORK CONFIGURATION MANAGEMENT THROUGH NETMIKO PYTHON LIBRARY**

The proposed herein methodology is based on the capabilities offered by the Netmiko python library. Netmiko is a multi-dealing SSH Python library that produces connectivity to community devices thru SSH protocol. This library adds

certain important functionalities to the paramiko library, which is the de-facto SSH library in Python. Netmiko simplifies the connectivity to a networking community device via SSH permitting the use of a smooth method for issuing remote calls like the “send\_command”, in order to be able to execute sets of commands on a device as well as to properly analyze the consistency of its response with the tool being linked to python. Netmiko is characterized as an open software supply with all code publicly available on GitHub and it’s absolutely easy to start using it.

Netmiko facilitates a growing list of networking products integration and configuration into complex network topologies. Such lists could be found within Netmiko documentation. Some providers offer device control with a variety of different PC application commands. As an instance, Holler provides two kinds of such commands for the same device: dell\_force10 and dell\_powerconnect; and Cisco offers many software systems variations at several product strains, like sidecisco\_ios, cisco\_nxos and cisco\_asa. The authentic Netmiko code and documentation is at <https://github.com/ktbyers/netmiko>

#### 4.1 LOGIN TO THE ROUTER

Here’s a simple script to log in to the router (at IP 192.168.255.249 with a username and countersign of cisco) and show the version:

```
from netmiko import ConnectHandler

device = ConnectHandler(device_type='cisco_
ios', ip='192.168.255.249', username='cisco',
password='cisco')

output = tool.Send_command("show version")
print (output)

tool.Disconnect()
```

The output of the execution of code with regards to a router is as follows. As we’re going to see within the pattern code, we name the ConnectHandler characteristic based on the Netmiko library, which takes four inputs (platform kind, IP address of tool etc.)

Depending upon the selection of the platform kind, Netmiko can understand the back spark

off and hence to issue the proper command through SSH into the particular component. Once the relationship is formed, we’re going to send commands to the component through the use of the send\_command approach.

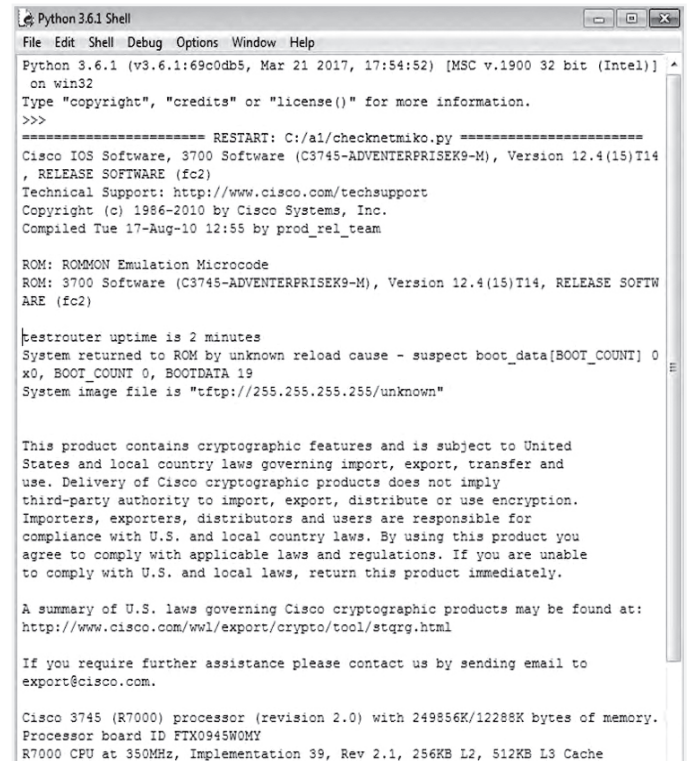


Figure 5. Retrieving records

#### 4.2. SEND COMMAND

Once we get the return value, the value is saved in the output variable as displayed below, thus, is saved in the string output of the command that we sent to the device, as the device response. The final line, which makes use of the disconnect feature, ensures that the connection is terminated clearly as soon as the task ends. For configuration (for example, it is desired to offer connection to the FastEthernet 0/0 router interface), we use Netmiko, as shown in the subsequent example:

```
from netmiko import ConnectHandler

print ("Before config push")

tool = ConnectHandler(device_type='cisco_
ios', ip='192.168.255.249', username='cisco',
password='cisco')

output = device.Send_command("display
walking-config interface fastEthernet zero/zero")
print (output)
```

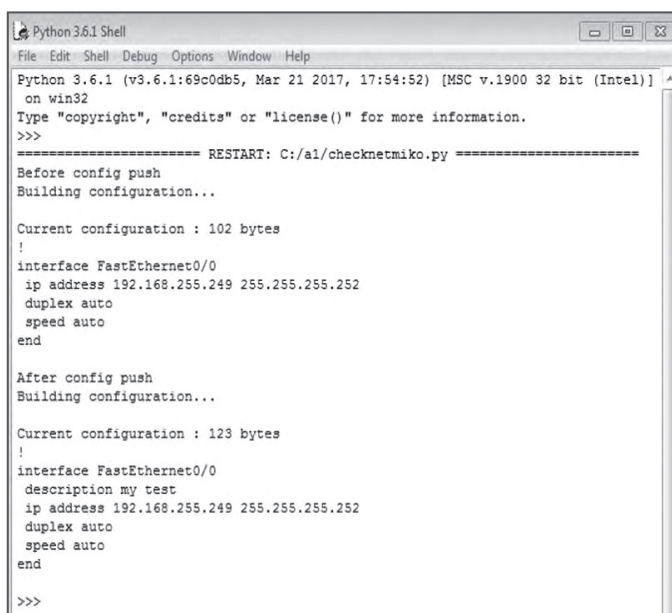


```
configcmds=["interface fastEthernet 0/0",  
"description my test"] device.Send_config_  
set(configcmds)  
  
print ("After config push")  
  
output = device.Send_command("show walking-  
config interface fastEthernet 0/zero")  
  
print (output)  
  
tool.Disconnect()
```

As we are capable to see, for config push, we don't need to perform any extra configurations but simply specify the instructions in the same order as we send them manually to the router through a listing, and pass that list as argument to the send\_config\_set feature. The output at Before config push may be a direct output of the FastEthernet0/zero interface, however, the output under After config push (in the figure 6 below), defines configurations managed using the input listing of instructions. In an exceedingly similar way, we are able to skip multiple instructions to the router, and Netmiko will get into configuration mode, write those instructions to the router, and exit config mode.

If we would like to ensure that the router writes the newly driven configuration to memory configuration, we use the following command after the send\_config\_set command:

```
device.Send_command("write memory")
```



```
Python 3.6.1 Shell  
File Edit Shell Debug Options Window Help  
Python 3.6.1 (v3.6.1:69c0db5, Mar 21 2017, 17:54:52) [MSC v.1900 32 bit (Intel)]  
on win32  
Type "copyright", "credits" or "license()" for more information.  
>>>  
===== RESTART: C:/al/checknetmiko.py =====  
Before config push  
Building configuration...  
  
Current configuration : 102 bytes  
!  
interface FastEthernet0/0  
ip address 192.168.255.249 255.255.255.252  
duplex auto  
speed auto  
end  
  
After config push  
Building configuration...  
  
Current configuration : 123 bytes  
!  
interface FastEthernet0/0  
description my test  
ip address 192.168.255.249 255.255.255.252  
duplex auto  
speed auto  
end  
>>>
```

Figure 6. Send Command Output

### 4.3 NETWORK CONFIGURATION MANAGEMENT THROUGH TEMPLATES USAGE

With all the routers accessible and at hand via SSH, it is permitted to configure a base template that sends the Syslog to a Syslog server and additionally ensures that simplest statistics logs are dispatched to the Syslog server. Also, after configuration management, a validation could be obtained to make sure that logs are being sent to the Syslog server.

The logging server information is as follows:

- Logging server IP: 192.168.20.5
- Logging port: 514
- Logging protocol: TCP

Additionally, a loopback interface (loopback 30) is desired to be configured with the loopback interface description.

The code traces for such a template are as follows:

```
logging host 192.168.20.5 delivery tcp port  
514  
logging lure 6  
interface loopback 30  
description " loopback interface"
```

To validate that the Syslog server is accessible for the logs sent, we use the display logging command. within the event with the output of the command containing the text:

```
from netmiko import ConnectHandler  
template="""logging host 192.168.20.5 transport  
tcp port 514  
logging entice 6  
interface loopback 30  
description " loopback interface"""  
username = 'test'  
password="test"  
#step 1  
#fetch the hostname of the router for the  
template  
for n in range(1, five):  
ip="192.168.20."format(n)  
device = ConnectHandler(device_type='cisco_ios',  
ip=ip, username='test', password='test')  
output = device.Send_command("show in
```

```
hostname")
output=output.Split(" ")
hostname=output[1]
generatedconfig=template.update("",hostname)
#step 2
#push the generated config on router
#create a listing for generateconfig
generatedconfig=generatedconfig.Split("\n")
tool.Send_config_set(generatedconfig)
#step 3:
#carry out validations
print ("*****")
print ("Performing validation for
:",hostname+"\n")
output=device.Send_command("display
logging")
if ("encryption disabled, link up"):
print ("Syslog is configured and reachable")
else:
print ("Syslog is not configured and NOT
accessible")
if ("Trap logging: level informational" in output):
print ("Logging set for informational logs")
else:
print ("Logging not set for informational logs")
print ("\nLoopback interface status:")
output=tool.Send_command("show in loopback
interface")
print (output)
print ("*****\n")
```

```
RESTART: C:/gdrive/book2/github/edition2/python_automation/config_syslog.py
*****
Performing validation for : rtr1
Syslog is configured and reachable
Logging set for informational logs

Loopback interface status:
Lo30          up          up          "rtr1 loopback interface"
*****

*****
Performing validation for : rtr2
Syslog is configured and reachable
Logging set for informational logs

Loopback interface status:
Lo30          up          up          "rtr2 loopback interface"
*****

*****
Performing validation for : rtr3
Syslog is configured and reachable
Logging set for informational logs

Loopback interface status:
Lo30          up          up          "rtr3 loopback interface"
*****

*****
Performing validation for : rtr4
Syslog is configured and reachable
Logging set for informational logs

Loopback interface status:
Lo30          up          up          "rtr4 loopback interface"
*****
```

Figure 7. Configure Loopback interface

## 5. IMPLEMENTATION HIGHLIGHTS OF AUTOMATED NETWORK CONFIGURATION MANAGEMENT GENERIC CASES

In this section we outline the implementation of certain generic configuration instances

### 5.1 SINGLE DEVICE CONFIGURATION

In the figure below a simple script for configuring a single network device is outlined.

```
netmiko_acl.py
1 from netmiko import ConnectHandler
2
3 cisco_device = {
4     'device_type': 'cisco_ios',
5     'host': '10.1.1.10',
6     'username': 'u1',
7     'password': 'cisco',
8     'port': 22,
9     'secret': 'cisco',
10    'verbose': True
11 }
12
13 connection = ConnectHandler(**cisco_device)
14
15 print('Entering the enable mode ...')
16 connection.enable()
17
18
19 commands = ['access-list 101 permit tcp any any eq 80',
20            'access-list 101 permit tcp any any eq 443',
21            'access-list 101 deny ip any any']
22
23 print('Sending commands to the device ...')
24 connection.send_config_set(commands)
25
26
27 print(f'Disconnecting from {cisco_device["host"]}')
28 connection.disconnect()
```

Figure 8. Configuring a single device

The script on using an object called cisco\_device, where all the information necessary to ssh management is saved to the device. The main information consists of the IP-address of the device, the username and password to login and the port needed for the connection.

The port in most cases used by the ssh protocol to connect a device is frequently port 22

### 5.2 MULTIPLE DEVICE CONFIGURATION

On the figure below a multiple-device configuration is shown, where device information and configuration commands are hard-coded. Each device has its own configuration table that may or may not differ from the other devices. A for loop is created to iterate through the device list and makes the configurations, one by one.

```
from netmiko import ConnectHandler

def execute(device, command_list):
    connection = ConnectHandler(**device)
    connection.enable() # entering the enable mode
    output = connection.send_config_set(command_list)
    print(output)
    connection.disconnect()

# defining a dictionary for each device and a list of commands to execute on that device
router1 = { 'device_type': 'cisco_ios', 'host': '10.1.1.10', 'username': 'u1', 'password': 'cisco',
           'port': 22, 'secret': 'cisco', 'verbose': True }
cmd1 = ['router ospf 1', 'network 0.0.0.0 0.0.0.0 area 0']

router2 = { 'device_type': 'cisco_ios', 'host': '10.1.1.20', 'username': 'u1', 'password': 'cisco',
           'port': 22, 'secret': 'cisco', 'verbose': True }
cmd2 = ['int loopback 0', 'ip address 1.1.1.1 255.255.255.255', 'end', 'sh ip int loopback 0']

router3 = { 'device_type': 'cisco_ios', 'host': '10.1.1.30', 'username': 'u1', 'password': 'cisco',
           'port': 22, 'secret': 'cisco', 'verbose': True }
cmd3 = ['username k9 secret abck9', 'ip domain-name k9']

# each element in the list is a tuple with 2 elements.
# the 1st element of the tuple is the dictionary which represents the device and the 2nd argument is a list
# of commands to execute on that device
routers = [(router1, cmd1), (router2, cmd2), (router3, cmd3)]

for router in routers:
    execute(router[0], router[1]) # router[0] is the dictionary and router[1] is the list with commands
```

Figure 9. Configuring multiple devices

### 5.3 CONFIGURING MULTI-VENDOR DEVICES

Figure 1: Configure multi-vendor devices

```
with open('devices.txt') as f:
    file_content = f.read().splitlines()

devices = list()
for item in file_content:
    tmp = item.split(':') #tmp is a list
    devices.append(tmp)

for device in devices:
    net_device = {
        'device_type': device[0],
        'ip': device[1],
        'username': device[2],
        'password': device[3],
        'port': 22,
        'secret': device[3], # this is the enable password
        'verbose': True
    }

    connection = ConnectHandler(** net_device)

    if not connection.check_enable_mode():
        connection.enable()

    #connection.config_mode()
    config_file = input('Enter configuration file for device type ' + device[0] + ' with ip ' + device[1])
    print('Sending commands to device ...')
    with open(config_file) as config:
        commands = config.read().splitlines()
        # print(commands)

    output = connection.send_config_set(commands)
```

Figure 10. Configuring multi-vendor devices

In the above a script is shown where multi-vendor devices can be configured at the same script, illustrating that we are not obligated to use different automation scripts for different device types.

### 5.4 CONFIGURING MULTIPLE DEVICES WITHOUT MULTI-THREADING

```
def connect_and_run(device, cmd='show run'):
    print('Connecting to device: ', device['ip'])
    connection = ConnectHandler(**device)

    print('Entering enable mode ...')
    connection.enable()

    print('Executing command: ', cmd)
    output = connection.send_command(cmd)
    print(output)
    print('#' * 40)

if __name__ == '__main__':
    with open('devices.txt') as f:
        devices = f.read().splitlines()

    device_list = list()

    for ip in devices:
        cisco_device = {
            'device_type': 'cisco_ios',
            'ip': ip,
```

Figure 11. Configuring multiple devices without multithreading

In the figure shown above, the script reads the IP address from a file called devices and configures devices one after the other. It finishes configuring one device and then, starts configuring another from the list of devices.

### 5.5 CONFIGURING MULTIPLE DEVICES USING MULTI-THREADING

In the figure below a script is shown to configure multiple devices. The script reads the IP from a device file and proceeds to configuring the devices at the same time. It executes the first step of configuration at one device then, continues to the other device to execute the same step. After finishing the first steps for all the devices, the script passes to the second step of automated configuration management and so on.

```
        'password': 'cisco',
        'port': 22,
        'secret': 'cisco', #this is the enable password
        'verbose': True
    }
    device_list.append(cisco_device)

#print(device_list)

#script starting time
start = time.time()

output_q = Queue()

for device in device_list:
    my_thread = threading.Thread(target=connect_and_run, args=(device, output_q, 'sh run'))
    my_thread.start()

main_thread = threading.current_thread()
for my_thread in threading.enumerate():
    if my_thread != main_thread:
        my_thread.join()

while not output_q.empty():
    output = output_q.get()
    print(output)
    print('#' * 40)
```

Figure 12. Configuring multiple devices using multithreading

## 6. CONCLUSIONS AND FUTURE WORK

One of the areas where most organizations have difficulties when it comes the moment to deal with network automation is where to start such process. It is herein strongly recommended that deployment teams should consider starting on small, and most common problems and issues. Using this strategy helps to build the bases and clarify the ideas for a network automation-strategy.

Beyond the start phase, many companies try to push harder to the topic, by following big and risky steps in the automation process. The so far results from relevant reports indicated that these decisions will make automation attempts far more difficult than it is supposed to be, by wasting

precious time and money, and this may set back progress for years.

Starting networking automation with the proposed methodology based on Netmiko library scripting can help groups manipulate their network infrastructure throughout the complete production lifecycle -- from building an initial infrastructure and evolving it throughout integrating multi-dealer products based new topologies and configurations, to managing everyday network automation, development and functionality services and tasks. A few simple points to keep in mind when beginning your network automation journey include:

- Pick the right tool
- Make small steps but meaningful ones
- Fight the ideas to fall back to manual processes.
- Define metrics to track success.

The results, discussions and conclusions drawn from this research report shed light on the advantages of an automated configuration management and topology verification method.

The proposed methodology based on Netmiko library, fulfills the paper's goal of developing and evaluating a method that automates network configuration management.

Netmiko based methodology's runtime performance is in favor of any comparison with the manual techniques discussed and its impact has been herein analyzed. The proposed methodology based on Netmiko library contributes to lowering the manual hard work required by employers to carry out the infrastructure reconfiguration. using automated scripts like the above discussed.

An expensive and time consuming manual configuration management system will eventually be replaced by means of a procedure that causes fewer mistakes, offering to the user the potential to correct easily any mistake monitoring system performance.

Network automation may be a solution for this problem, it saves time, labor and costs. Network automation combined with testing and verifications can help and advance all the process of automation, upgrading it to another level.

While automation is combined with testing and verification, the wide variety of errors may be notably reduced.

Several enhancements in this research effort could be discussed and associated with two main areas.

First, the scripts could be upgraded to do more processes, to cover more aspects of the network automation, like creating scripts that make automatic check for the device software

or firmware, that find the best adaptive time to install the updates, time that doesn't affect the network performance and ensures the network sustainability.

Second the scripts could be rewritten or enhanced partially to improve the efficiency of execution. Also adding newer and better adapted libraries to the scripts, could make the automation process evolve even further in its coverage. Moreover, towards these goals, the integration of AI (Artificial Intelligence) in the automated network management and its configuration management relevant scripts could be the future of network automation field.

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## RELATIONSHIP BETWEEN INTRINSIC MOTIVATION AND GENDER IN THE CONTEXT OF X AND Y LEADERSHIP STYLES IN THE MACEDONIAN ELECTRICAL APPLIANCES SECTOR

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### ABSTRACT

Leadership is one of the most researched topics in the contemporary business organisations. Over the decades, leadership and various leadership styles have proven to be key to successful organisations. As the world is currently experiencing many transformations and new generations of employees take over, the leadership styles evolve and leaders seek for new approaches to motivate and inspire employees in achieving growth both on individual and organisational level.

Accordingly, this paper explores two distinctive leadership styles, more specifically, democratic or transformational and autocratic or transactional. The research is based on the McGregors' Theory X and Theory Y of leadership. As such, X Theory argues that employees avoid tasks and responsibility, desire to be controlled and lack ambition, while Y Theory assumes that employees are creative and positive about their work, and take actions to accomplish the organisational goals.

Furthermore, the paper builds upon the theoretical concept of the previous research body on leadership styles and the importance of intrinsic motivation. The concept of intrinsic motivation is further enriched with the gender perspective.

The analysis anticipates quantitative research based on a previously validated instrument that was implemented among 187 employees in the biggest Macedonian electrical appliances retail company.

Findings suggest that there is positive relationship between Y leadership styles and intrinsic motivation. In addition, it was identified the both male and female demonstrate similar behavior relative to Intrinsic motivation.

This research endeavour, shall contribute towards understanding the current practices and desired leadership styles in a dynamic organizational setting that seeks physical interaction with the customers in a highly competitive setting such as the electric appliances retail industry in the Republic of North Macedonia.

It offers grounds for further research to overcome the limitations of this paper such as the sample size, male gender prevalence and generalisation for retail industry of electrical appliances as a whole given the administration of the instrument in a single company.

**Keywords:** Motivation, Gender, X/Y Theory, North Macedonia, Retail sector

### 1. INTRODUCTION

In the organizational context of managing people, most leaders build environment of understanding

and satisfying employees' needs. All organizations have both self-motivated and externally motivated employees, so motivation is crucial to organi-

zational success, loyalty, productivity and self-realization. Yet, keeping employees motivated and inspired is a big challenge for the contemporary organization given the latest developments in the business operations as well as the new generations of employees and their novel expectations. More specifically, business leaders face many challenges in managing, motivating and retaining their employees in highly competitive industries such as the electronic appliances retail sector.

This paper aims to determine the relationship between the desired leadership styles and intrinsic motivation from a gender perspective. The research has been conducted in one of the largest retail companies, with demonstrated sustainable growth in the past decade.

## **2. LITERATURE REVIEW**

### **2.1 THE X THEORY VERSUS THE Y THEORY**

In general, various managerial styles in the literature or in practice can be oriented towards the autocratic (traditional) or towards the democratic (modern) leadership style (Mohamed and Nor, 2013). In this context, there are studies that identify autocratic leadership style as commanding, comforting, transactional, directing, punitive-controlling (Richer and Vallerand, 1995) and exploitative-authoritative (Carson, 2005). On the contrary, the democratic style is recognized as transformational (Bass, 1985), charismatic (Conger and Kanungo, 1987), participating (Mohamed and Nor, 2013), visionary, autonomy-supportive (Richer and Vallerand, 1995) and flexible (Yukl, 2008). Yet, in the organizational context, many leadership styles are determined by the spirit of the corporate national culture (McLaurin, 2008) or international culture (Hofstede, 1994) while Bobic and Davis (2003) believe that the leadership styles are further shaped in accordance with the type of the organization.

McGregor (1957) in his *The Human side of the enterprises* offered a provocative theoretical foundation for X/Y leadership styles that is frequently applied and tested by the researchers and academicians. Managers that practice Theory X assume that employees are lazy, tend to avoid work and responsibility, lack ambition and need to be directed and controlled. So, McGregor's The-

ory X relates to direction, authority, and structure (Carson, 2005) under the assumption that people are not ambitious, yet seek for security (Bass and Avolio, 1994).

In contrast, the Theory Y applies to managers who believe that people have self-control and self-direction, work independently, demonstrate responsibility, along with creativeness in accomplishing the organisational goals. Therefore, Theory Y refers to change, adaptation, mutuality and commitment (Bobic and Davis, 2003), assuming that workers are self-starters, self-motivated, enjoy taking ownership of their work, seek and accept responsibility, and need little direction (McGregor, 1957). The transformational leadership style, associated with the Theory Y, implies motivational and people-oriented approach as well (Bass, 1985; Bass and Avolio, 1994). Transformational leaders motivate and engage the followers by building a shared organisational vision and goals, challenge their followers' abilities, and effectively listen to them (Bass, 1985; Bass and Avolio, 1994; Judge and Piccolo, 2004). According to Mohamed and Nor (2013), X leadership style generates less productivity, poor performance as well as less work effort, while Y leadership style generates high productivity as well as simultaneous fulfilment of personal and organizational goals. However, other authors have found that in some circumstances leadership style X prevails in the sense that some employees possess closer preferences to X rather than Y leadership style (Bobic and Davis, 2003). Some studies also claim that X leadership style is more appropriate in hierarchical (banks, governmental) organizations rather than in innovative organizations (high-tech industries), therefore, the adaptive management styles might be more appropriate in many organizations rather than the mere democratic or autocratic style (Bobic and Davis, 2003; Baesu and Bejinaru, 2015).

### **2.2 INTRINSIC MOTIVATION AND X/Y LEADERSHIP STYLES**

In the literature, many studies examine the relationship between intrinsic motivation and employee's outputs. It has been proven that intrinsic motivation influences the employee's performance (Cerasoli et al., 2014; Menges et al., 2017),



creativity (Zhang and Bartol, 2010) as well as competence and self-determination (Deci and Ryan, 1980). Therefore, organisational leaders should support employees in their needs, interests and goals. Kulkarni (2015) claims that some environmental factors could provoke the intrinsic motivation, one of them being leadership style, also challenging work, opportunities to develop, recourses for professional development, and etc. Larsson et al. (2007) suggests that Y oriented leaders are more effective compared to the X oriented leaders as they contribute to better health and less absences, long tenures, and stronger organisational culture. Y oriented organizations were identified to stimulate the employees' intrinsic factors that later contribute to increased organizational identity and self-accomplishment (Ryan and Deci, 2000). Other authors, claim that demonstrated leader's passion stimulates achievement of personal and organizational goals via the notion of intrinsic motivation of the employees (Kulkarni, 2015). The demonstrated passion as inner energy influences others to achieve goals and followers are intrinsically inspired to follow their leader and commit to task accomplishment. As such, motivation occurs as result of external motives such as money, rewards, punishment or internal motives such as self-worth or joy. In addition, Bono and Judge (2003) argue that intrinsic motivation is generated by the self-concordance, that reflect in employee proactiveness. On the contrary, when environmental and organizational values are just words, they are being ignored in the practice (Kulkarni, 2015), and the employees' inner value system generates dissatisfaction and generates no results. Barbutto (2005) further concludes that if the type of work produces fun, enjoy, self-worth, embodies emotions and challenges work behaviour then employees' intrinsic motivation stimulates them to perform even better.

Number of studies explore the relation between the leadership styles oriented to Y Theory and employee motivation (Keegan and Hartog 2004; Buble et al., 2014; Aunjum et al., 2017). Thus, Fiman (1973) found that the employees of a large retail company are more satisfied and motivated with a manager whose orientation inclines towards the Y leadership style rather than X leadership style.

Regarding the intrinsic motivation, Buble (2014) found out that there is a relationship between leadership styles and managers' motivation where leadership style significantly determines manager's intrinsic motivation more than the extrinsic motivation. In addition, managers' leadership styles at the higher levels are softer authoritarian then the lower levels where the pure autocratic leadership style is more dominated. Richer and Vallerand (1995) have researched that subordinates' intrinsic motivation, self-determination and competence is significantly influenced by autonomy-supportive and non-punitive controlling management styles (Y oriented). In addition, autonomy-supportive generates more effects that are positive while the punitive-controlling style (X oriented) has more negative effects on subordinate's motivational feelings. In this regard, leaders should tend to create working environment that intrinsically motivates employees and their followers (Kulkarni, 2015).

In addition, there are studies that indicate gender differences in personality and motivation, in general. Some studies for example indicate that female employees scored higher than males in internal and external motivation but have lower values in motivation (Vallerand et al., 1992; Orsini et al., 2015; Can, 2015; Barkoukis et al., 2008). In conclusion, in comparison with the other two areas of interest of this paper, there is significant lack of data explaining mechanisms of gender differences and disparities in relation to intrinsic motivation.

### **3. METHODOLOGY**

The research anticipated both theoretical analysis of academic articles from relevant scientific journals, related to intrinsic motivation, X/Y Theory, gender perspective and a quantitative methods used to collect data by a convenience sampling. The research was conducted in the largest Macedonian retail company of electrical appliances for domestic use. The anonymous questionnaire was distributed among 427 employees, through the Human Resources Department, with prior approval by the management. 184 questionnaires were collected. The distribution of the questionnaire was in hard copy to employees from the head office and branches in Skopje and 10 loca-

tions throughout the Republic of North Macedonia. The employees included in the survey were informed of the scientific and research purposes of the study and the anonymous character of the questionnaire. The gathering of the data was completed in 10 days in March 2019.

The structured questionnaire consisted of 49 items divided into six groups, 43 statements and 6 demographic questions. Thirty-two out of 49 items were selected for the purposes of this paper. The statements included five-point Likert scale, whereas 1-strongly disagree, 2- disagree, 3-neutral, 4- agree, and 5-strongly agree. The 32 items were developed and organized in three parts. The first construct consists of 26 questions linked to the preferences of X or Y leadership styles, adopted from Kopelman et al. (2009). In particular, the statements with odd numbers from 1-26, were reverse coded as follows: 1-5, 2-4, 4-2 and 5-1. The constructs' Cronbach Alpha test was 0.71, considered as reliable consistency and acceptable for further research. We have used referent values from DeVellis (2012) for internal consistency of previous similar researches. The second part of the questionnaire (questions from 27-32) aimed at measuring employee's intrinsic motivation, validated instrument adopted from Kuvaas and Dysvik (2009). The Cronbach Alpha score of the internal consistency of the construct was 0.86, also indicating high reliability of the sample. The last part was designed to collect demographic data of the respondents within the company, such as gender, age, education, time in the company, position and department.

The collected data from the questionnaire was processed both Excel and IBM SPSS. Three composite variables were constructed, two separate for the employees of X and respectively Y leadership style preferences and Intrinsic Motivation. A correlation analysis was performed.

The demographic profile of the sample indicates that the typical respondent is male (74%), younger than 20 years (47%), along with an associate-level of education (36%), 1-3 years (46%) work experience in the sales department (60%). Its important to stress that a significant number of the respondents belongs to the age group between 20-29 years old (34%) indicating a rather young workforce in the company including Z gen-

eration employees and millennials.

#### 4. HYPOTHESIS

For the purpose of identifying the relationship the X/Y Theory and employees' intrinsic motivation and the relationship between the intrinsic motivation and gender, the following hypothesis were developed:

- H0: There is no relationship between X theory and the intrinsic motivation of the employees in the electronic appliances retail industry.
- H1: There is positive relationship between X theory and the intrinsic motivation of the employees in the electronic appliances retail industry.
- H10: There is no relationship between Y theory and the intrinsic motivation of the employees in the electronic appliances retail industry.
- H11: There is positive relationship between Y theory and the intrinsic motivation of the employees in the electronic appliances retail industry.
- H20: There are no differences in the intrinsic motivation of the male and female employees in the electronic appliances retail industry.
- H21: There are differences in the intrinsic motivation of the male and female employees in the electronic appliances retail industry.

#### 5. RESULTS AND DISCUSSION

The variables associated to X/Y Theory have mean value of the 3.27, indicating that the sample moderately prefers managers who exhibit Y type of leadership. So, respondents prefer for participative managerial style over autocratic allowing them to be actively included in the organisational planning and goal setting. Hence, there are 3 variables that have average value close to 2.5 suggesting that there are some employees that favour autocratic style and look for specific guidance and control at work and earn only because they have to settle bills. The responders who are closed to Theory X can be described as a personality who

has negative view of human nature, assuming that employees are lazy, unmotivated, and will do anything to avoid working. The findings are in line with previous studies (McLaurin, 2008). The fact that there are employees that also prefer X leadership style may be observed in retail's sector orientation towards hierarchy (Bobic and Davis, 2003; Baesu and Bejinaru, 2015).

We may also take into consideration the respondents' age in the sample. Namely, more than 90% of employees are under the age of 29 or belong to the Y, Z Generations and Millennials. As the retail sector operates in shifts, and over weekends, it attracts younger workforce especially in sales department. These employees seek fast lane careers, yet Y type of leadership correlates with the expectations and believes of the new generations that desire autonomy and participative management.

*Table 1. Pearson Correlations between variables X style, Y style and Intrinsic Motivation.*

| Correlations |                     |        |        |        |
|--------------|---------------------|--------|--------|--------|
|              |                     | InMot  | X      | Y      |
| IntMot       | Pearson Correlation | 1      | -.026  | .308** |
|              | Sig. (2-tailed)     | .730   | <.001  |        |
|              | N                   | 184    | 184    | 184    |
| X            | Pearson Correlation | -.026  | 1      | .222** |
|              | Sig. (2-tailed)     | .730   |        | .003   |
|              | N                   | 184    | 184    | 184    |
| Y            | Pearson Correlation | .308** | .222** | 1      |
|              | Sig. (2-tailed)     | <.001  | .003   |        |
|              | N                   | 184    | 184    | 184    |

\*\* Correlations is significant at the 0.01 level (2-tailed).

The Pearson correlation coefficient ( $r = 0.308$ ) indicates a moderate positive degree of correlations between the employees' preferred Y leadership style and Intrinsic Motivation (Bono and Judge, 2003; Zhang and Bartol, 2010; Buble, 2014), at the level of significance  $p < 0.01$  (Table 1). Thus, the hypothesis H11 is supported while H1 is rejected as employees who prefer X leadership style are not intrinsically motivated. Our findings related to the specific industrial type of organisation are similar to those of Fiman (1973).

To further explore if there are differences in the specific behaviour of male and female respondents relative to the Intrinsic Motivation, t-test was performed for each of the 6 items of the constructs. The outcome indicated there are no significant differences in the intrinsic motivation

of the two genders, thus H21 was rejected. This finding is in contrast with past studies that identified different level of motivation among the male and female employees (Orsini et al., 2015; Can, 2015). This finding may have occurred as consequence of dominance of the males in the research sample.

To sum up, the Intrinsic Motivation variable's average value was 3,46 indicating that the respondents consider their work as motivating, meaningful, enjoyable and exciting. To add, older employees have a higher average value of intrinsic motivation of 4,16, in comparison with the younger employees, showing 3,37 average.

We conclude that gender does not influence the prevalence of Theory Y in the electrical appliances retail industry represented with the largest company in the country. This claim is opposite of the current industry trends and theory where women favour mentoring and coaching roles associated with transformation leadership style (Theory Y), while men dictate and command position which translates into transactional leadership style (Theory X) (Merchant, 2012).

The study has few limitations that offers grounds for further research to tackle the shortfalls. The limitation refer to the sample size, male gender prevalence in the sample, and generalisation for retail industry of electrical appliances as a whole given the administration of the instrument in a single company. Interline spacing is suitably set to prevent overlapping but without leaving too much space.

## CONCLUSION

This research tried to identify a correlation between the X/Y preferred leadership style and employees' intrinsic motivation. In addition, it searched for differences in the level of intrinsic motivation among female and male respondents in the largest electrical appliance retail company in the Republic of North Macedonia. The literature review and the theoretical models identify to predominant leadership styles. Both, the autocratic or transactional and the democratic or transformational leadership styles are theoretically backed up in the McGregor's X/Y theory of leadership. A validated questionnaire consisting

of 32 statements and later summed up in three variables was used to test the hypothesis. All variables were tested for internal consistency.

Research findings indicate a statistically moderate correlation between the Y leadership style and the Intrinsic Motivation, which is in line with previous findings. However, it was identified that there are not significant differences across the items that represent the Intrinsic Motivation among the female and male respondents, a finding contrasting the past studies.

The research implies that leaders and managers in the retail sector shall adopt participative environment with less supervision to grow and retain new generation employees. Finally, setting creative environment as well as more meaningful tasks motivates employees towards self-direction and self-control.

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## A REGRESSIVE ANALYSIS OF RELATIONS BETWEEN INNOVATION AND BUSINESS SOPHISTICATION UNDER A QUALITY MANAGEMENT HOLISTIC APPROACH

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### ABSTRACT

My goal in conducting this study is to present strong connections between innovation and business sophistication, worldwide, since innovation and business sophistication issues, related to quality and quality management too, have been subject to increasing interest all around the world.

The methodology of the research was collecting data and information about the innovation index and business sophistication worldwide and describing the newly introduced ISO 56000 family of standards, handling descriptive statistics for innovation index and business sophistication as well as a correlation and regressive analysis (inferential statistics) for relations between innovation index and business sophistication, which resulted on the main conclusion of this study that relations between innovation and business sophistication, statistically verified, are strong, so ISO 56000 standards family application is needed in the time of business sophistication, achieving competitive advantage.

The main recommendation is that application of ISO standards generally and the application of the ISO 56000 family of standards helps companies to strengthen their commitment to their clients, improving innovation and business sophistication activities, processes and procedures, and economies worldwide to achieve a competitive advantage.

**Keywords:** Innovation, business sophistication, ISO standards, quality, quality management, competitive advantage.

### 1. INTRODUCTION

Discussing innovation and business sophistication we immediately think about new products and/or services, as well as new combinations that result in improved ones, new methods of processing, manufacturing, assembling, entering new markets, a new way of resources usage, innovated business models, etc., and this related to effectiveness and efficiency of processes, procedures, methodologies, methods, tools, technologies involved on the process of production of goods and services.

Innovation and business sophistication do not always require inventions, but easy implementation in practice problem-solving techniques and decision-making, implementation of individual and group activity-based ideas, etc.

Currently, there is an increasing interest in innovation and business sophistication, especially related to a quality culture and ISO standards. Quality culture serves as a guide for continuous improvement, belonging to all members of an organization(s), and forming a connection between internal clients and suppliers. The core value of quality culture is embodied in ISO standards, for which there is an increasing interest worldwide, aiming to achieve a competitive advantage. Between them, ISO 9000, ISO 14000, ISO 20000, ISO 22301, ISO 27000, ISO 45000, and ISO 50000 family of standards and especially the ISO 56000 family of standards, which is directly related to Innovation management, introduced in 2019, which clashes with the period of pandemics of Covid – 19 too, are the most required standards. Innovation, business sophistication, quality,

quality culture, quality culture management, and ISO standards, are becoming an important part of business models achieving competitive advantage, under the new reality and new normality.

## 1. LITERATURE REVIEW

Currently, literature for innovation, business sophistication, quality, ISO standards, the culture of quality, etc, has been improved all around the world, besides the country and level of economic development. This is because concepts of innovation, business sophistication, quality, quality management, and ISO standards, applied correctly, help private and public organizations to be more competitive in an open market when and where the offer is much higher than the demand, one of the main characteristics of last 50 years of the world economy.

### 1.1. INNOVATION

As per an OECD report (Nadim Ahmad and Richard G. Seymour 2006), since around 35 years ago, entrepreneurship has been defined as an act of innovation that involves endowing existing resources with new wealth-producing capacity (Drucker, 1985), with its core, which lies with the creation and exploitation of entrepreneurial opportunities regardless of the context (Shane 2003) and as a creative activity that takes place when neither the goal nor often the initial conditions are known at the start, but constructed during the process (Sarasvathy. 2001).

Innovation is defined by the Oslo Manual (OECD 2005) of the Organization for Economic Cooperation and Development (OECD) as “the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations”.

In economics, further to Schumpeter’s lesson, it is now part of mainstream thinking to consider innovation as the primary engine of economic dynamic: a process of “...industrial mutation that increasingly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one (Schumpeter. 1942)”.

This notion is particularly relevant in today’s globalized world and knowledge-based economies, which rely ever more on intangible resources.

Not surprisingly, innovation is widely recognized as one of the essential drivers of successful business and a key contributor to the productivity and economic and social development of nations.

Innovation is the practical implementation of ideas that result in the introduction of new goods or services or improvement in offering goods or services (Schumpeter. 1993). ISO TC 279 on innovation management proposes in the standards, ISO 56000:2020 (ISO 2020) to define innovation as “a new or changed entity creating or redistributing value”.

According to the International Organization of Standards, “an innovation is a new or improved product or process that differs significantly from previous products or processes and is made available to users. This definition is in line with those found in ISO standards so that they can be useful tools for comparing and assessing innovation within and amongst organizations” (ISO. 2019).

Some common element in the different definitions is a focus on newness, improvement, and spread. It is also often viewed as taking place through the provision of more-effective products, processes, services, technologies, artworks business models that innovators make available to markets, governments, and society. Innovation is related to, but not the same as, invention: (Bhasin, Kim. 2 April 2012) innovation is more apt to involve the practical implementation of an invention (i.e. new/improved ability) to make a meaningful impact in a market or society (Morgan 2015), and not all innovations require a new invention (Schumpeter 1939).

The innovation system in any country consists of institutions, rules, and procedures that affect how the system acquires, creates, disseminates, and uses knowledge. Innovation in a developing country concerns not only the domestic development of frontier-based knowledge but also the application and use of new and existing knowledge in the local context. Innovation requires a favorable climate for entrepreneurs, which is free from bureaucracy, regulations, and



other obstacles (WB Institute, 2005).

Designing and developing cutting-edge products and processes to maintain a competitive edge requires an environment that is conducive to innovative activity, supported by both the public and the private sectors. In particular, it means sufficient investment in research and development (R&D), especially by the private sector; the presence of high-quality scientific research institutions; extensive collaboration in research between universities and industry; and the protection of intellectual property (Porter & Schwab, 2008).

### **SOURCES OF INNOVATION**

Innovation may occur as a result of a focused effort by a range of different agents, by chance, or as a result of a major system failure. According to Peter F. Drucker, the general sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood, and meaning, in the amount of already available scientific knowledge, etc (Drucker. 2002).

The robotics engineer Joseph F. Engelberger asserts that innovations require only three things:

- a recognized need
- competent people with relevant technology
- financial support (Engelberger 1982).

As per current tougher and tougher competition, globalization of products, services, production mode, business models and markets, as well as the implementation of new technologies, it looks that the success of businesses is dependent on effectiveness, efficiency, and intensity of innovation, which is considered as a decisive condition of competitive advantage in entrepreneurship, as a process created through interactions between various actors, which represents an important element of a company's future success.

It is clear that the growth of output is not attributable to labor or capital but is deemed to be linked to innovation and technological change (Neil Robert Anderson, Kristina Potočnik, Jing Zhou, 2015).

Other authors stress the relationship between innovation, integrative creativity, entrepreneurship, leadership, and management too (Shung Jae Shin, Xiaomeng Zhang, and Kathryn M. Bartol (2015), Kris Byron and Shalini Khazanchi (2015), Lucy L. Gilson, Hyoun Sook Lim, Robert C. Litchfield, and Paul W. Gilson (2015), Jill Perry-Smith and Pier Vittorio Mannucci, (2015).

As per above, considering competitive advantage as one of the main driving forces for entrepreneurship, innovation, and creativity as key factors should be considered, requiring physical and nonphysical support for an optimal result.

Every crisis brings opportunities and room for creative disruption. One side effect of the current crisis has been to stimulate interest in innovative health solutions, naturally, but also for areas such as remote work, distance education, e-commerce, and mobility solutions. With growing attention to innovation as the way to build a sustainable and inclusive future, unleashing these positive forces may well support societal goals, including reducing or reversing long-term climate change. (GII 2021).

The unprecedented global crisis that resulted from the outbreak of COVID-19 has propelled us into reinvigorating the important dimension of innovation to mitigate the pandemic's profound adverse effects on the economy and restore growth, calling for nations to embrace innovation as never before. While the crisis has naturally stimulated interest in innovative healthcare solutions, it has also catalyzed other areas, such as remote working, distance learning, e-commerce, and mobility solutions (GII. 2021).

The COVID-19 pandemic has triggered severe health and economic crises that will have lasting impacts. Vaccine research and scientific investigation to prevent the spread of coronavirus have increased awareness of the pivotal role of science, technology, and innovation (STI) in economic and social development (GII. 2021).

Organizations that thrive on time of crisis have leaped ahead in the technological world moved away from traditional competencies (innov8rs. 2021), and there is a unique time now for companies to create, innovate and standardize excellent, meaningful products that customers

truly need and innovation is an instrument of development that plays an increasingly important role in global trade. Particularly over the past two decades, the arena of global trade has been changing, with economies of scale gradually being replaced by an innovation economy focused on high-value-added products and services (GII. 2021).

Innovation has long been argued to be the engine of growth. It is important to note that it can also provide growth, almost regardless of the condition of the larger economy. Economies are more likely to experience growth due to the development of products, such as new computer software or new pharmaceutical drugs than to reductions in prices of existing products, such as telephones or motorcars. Indeed, early observations suggested that economic development does not occur in any regular manner, but seemed to occur in bursts or waves of activity, thereby indicating the important influence of external factors on economic development. It was Marx who first suggested that innovations could be associated with waves of economic growth, and later others (Schumpeter, Kondratieff, Abernathy and Utterback, Domar, Harrod), have argued the longwave theory of innovation, stressing one of the most important influences on innovation seemed to be industrial research and development (Trott. 2015).

The success or failure of an innovation or a new product<sup>1</sup> in the marketplace is determined by how well it is accepted by customers, how fast it diffuses among the adopter population, and how large a market it creates over a period of time. New product entry strategy and competitor responses to the entry also play important roles in the success or failure of the innovation. Thus, customer adoption, diffusion, market growth, product life cycle, new product entry strategy, and competitor responses all help to shape the market evolution process for an innovation (Shane. 2009).

## **1.2. INNOVATION AS AN ISO FAMILY OF STANDARDS. ISO 56000**

Innovation is the fuel that drives a successful business. And organizations that give their managers and employees the tools to respond to and make the most of opportunities, both internal and external, are well placed to grow

profits and improve the health and well-being of their employees and, thereby, the wider society. With effective innovation management systems in place, organizations – both large and small – can not only be in a better position to achieve their business growth goals but also be more agile and better prepared in their response to unexpected challenges and disruptions (Ann Brady. 2021).

An innovation management system helps organizations capture the best ideas and continually improve to keep up with the competition. The latest standard in the ISO innovation management series has been published in 2019 (Clare Naden. 2020).

Alice de Casanove, Chair of the ISO technical committee responsible for the standard, says all organizations, whatever their nature or size, need to continually evolve to survive, and the ISO 56000 series will help them to do that in a structured and effective way. “Innovation is about creating something new that adds value; this can be a product, a service, a business model, or an organization. And the value that is added is not necessarily financial, it can also be social or environmental, for example,” she says. “The ISO 56000 family will help organizations significantly improve their ability to survive in our changing and uncertain world. They allow organizations to permanently reinvent themselves.” (Clare Naden. 2020).

The ISO series on innovation management includes the following published documents:

- ISO 56000:2019 - Innovation management — Innovation management system — Guidance
- ISO 56002, Innovation management – Innovation management system – Guidance
- ISO 56003, Innovation management – Tools and methods for innovation partnership – Guidance
- ISO/TR 56004, Innovation management assessment – Guidance
- ISO 56005, Innovation management – Tools and methods for intellectual property management – Guidance
- ISO 56006, Innovation management – Strategic intelligence management – Guidance
- ISO 56007, Innovation management – Idea management
- ISO 56008, Innovation management – Tools

and methods for innovation operation measurements – Guidance (ISO. 2019)

It is clear that even for International Standards Organization, relations between Innovation and Creativity are strong, since the ISO 56000 family of standards of innovation expresses the connection clearly, saying that, the application of ISO standards generally and the application of the ISO 56000 family of standards helps companies to strengthen their commitment to their clients, improving innovation and creativity activities, processes and procedures, and economies worldwide to achieve a competitive advantage.

### **1.3. BUSINESS SOPHISTICATION AND ITS RELATIONS WITH INNOVATION**

The economic management agenda in many economies around the world is the transition from an efficiency-driven economy to an innovation-driven one. To this end, their economic policy-making should benefit from valid orientation and indicators for this transition. Utilizing a comparative approach and benchmarking from successful economic experiences around the world can help policymakers and business leaders manage the economy and achieve a higher level of prosperity. In this regard, improving national competitiveness is a key factor (Vares et al., 2011).

According to the International Organization of Standards “Innovation is not just about shiny new inventions or discoveries. Innovation is a crucial business need as it relates to a company’s ability to identify and pursue new areas of opportunity while understanding and responding to changing conditions in its environment. It also helps organizations to create value while managing uncertainty by leveraging the knowledge and creativity of the people who work there. It is a fundamental factor in business sustainability and economic viability, as well as a key contributor to the development of society as a whole. Innovation is essential because the world never stays still. Innovative organizations also contribute to many of the United Nations’ Sustainable Development Goals, including Goal 9, which aims to “build resilient infrastructure, promote inclusive and sustainable industrialization and foster the innovation”.

ISO has developed a large portfolio of International Standards and guidance documents that enable an organization to align all its systems and processes to undertake innovation activities and initiatives. They address all factors that contribute to an organization being innovative, right down to the implementation of an effective innovation management system (ISO. 2019).

In research that intended to investigate the relationship between “Innovation” and “Business sophistication”, authors using the Global Competitiveness report data in 2011-2012, activated secondary analysis research, with 142 countries’ data, evidenced that there is a meaningful relationship between “Innovation” pillar and “Business sophistication” pillar; and “Innovation” pillar has a positive effect on “Business sophistication” pillar (Razavi, Abdollahi, Ghasemi, Shafie. 2011).

In research that intends to investigate relations between innovation and business sophistication and their indication on entrepreneurship, authors have explored the relationship between entrepreneurship, the entrepreneurial ecosystem, and global competitiveness, identifying the role of innovation and business sophistication in achieving global competitiveness by fostering the entrepreneurship ecosystem, a strategic theme that has drawn the attention of various stakeholders such as business players, regulators, and related coworking organizations to promote a healthy environment for entrepreneurship. This research has offered a valuable understanding of the relationship between global competitiveness and factors of the entrepreneurship ecosystem on the one hand, and innovation and business sophistication on the other.

As per this research, “entrepreneurship has been considered as a key driver in fostering the economic development of the countries”. This study uses the 2013-14 country-level data from the World Bank - WB, World Economic Forum (WEF), and the Global Entrepreneurship Monitor Consortium - GEM. The key finding of the study shows that innovation and business sophistication play prominent roles and are linked with entrepreneurship in promoting global competitiveness, recommending that “countries

should think of innovation and business sophistication in designing the entrepreneurship program to achieve higher competitiveness” (Gandhi, Maria, Catharina Badra. 2020)

In a paper published about economic and business perspectives including the developing countries, one main conclusion that comes up by a group of experts was “that changes by globalization will affect the SMEs and entrepreneurs in a different type of economies both on a national and regional perspective. The world is globalized so is the world for entrepreneurs and innovations. All types of companies will be affected by the changes that one nowadays could observe, not only SMEs or innovative entrepreneurship but of course also the behavior of multinationals and large firms, and the relations between large and small firms. More or less every type of firm could in the future be an actor in a global market. One reason is the new technology which means that even very small local firms will have such a possibility; a factor which is analyzed in this report. On the other hand, this means increased competition from many more firms than one is used to realizing (SGC. 2009), which requires business sophistication too.

In a paper about relations between innovation, business sophistication and economic growth, authors stated improvement in business sophistication triggers innovation capacity and support macroeconomic stability. Innovation capacity would also need to be expanded in the long-run, which positively leads to advanced business sophistication that has a cyclical effect. If policymakers intend to accelerate business sophistication, then their attention should be directed towards maximizing the economic indicators in the long-run (Kirikkaleli & Ozun. 2019).

Business sophistication is conducive to higher efficiency in the production of goods and services. This leads, in turn, to increased productivity, thus enhancing a nation’s competitiveness. Business sophistication concerns the quality of a country’s overall business networks as well as the quality of individual firms’ operations and strategies. This is particularly important for countries at an advanced stage of development when the more basic sources of productivity improvements have

been exhausted to a large extent. The quality of a country’s business networks and supporting industries, as measured by the quantity and quality of local suppliers and the extent of their interaction, is important for a variety of reasons. When companies and suppliers from a particular sector are interconnected in geographically proximate groups (“clusters”), efficiency is heightened, greater opportunities for innovation are created, and barriers to entry for new firms are reduced. Individual firms’ operations and strategies (branding, marketing, the presence of a value chain, and the production of unique and sophisticated products) all lead to sophisticated and modern business processes (Porter & Schwab, 2008, p.8).

Business Process Management and ISO are typically addressed as two different endeavors, but they can be brought in alignment to improve the quality of businesses. A wide range of systems, including BPM and ISO, have been introduced in the past decades and have been explored and tried by organizations all over the world to attain best business practices. A company that is process-oriented and ISO-certified benefits when there is an alignment of BPM with the ISO standards (Breyfogle. 2015)

Business sophistication (GII. 2021) includes:

- Knowledge workers
- Innovation linkages
- Knowledge absorption
- Knowledge workers include:
  - ~ Knowledge-intensive employment
  - ~ Firms offering formal training
  - ~ GERD performed by business
  - ~ GERD financed by business
  - ~ Females employed w/advanced degrees
- Innovation linkages include
  - ~ University-industry R&D collaboration
  - ~ State of cluster development and depth
  - ~ GERD financed abroad
  - ~ Joint venture/strategic alliance deals
  - ~ Patent families

- Knowledge absorption includes:
  - ~ Intellectual property payments
  - ~ High-tech imports
  - ~ ICT services imports
  - ~ FDI net inflows
  - ~ Research talent (GII. 2021)

#### **1.4. MEGATRENDS OF 2020 – 2030**

Five main megatrends for the next 10 years shall be (1) Population growth, as the heart of the shift in economic power. (2) The impact of global warming is all around us, significantly impacting yield and coastal regions. (3) We're in the midst of a fourth industrial revolution, which will become known as the digital revolution, with the rapid advancement of technology, AI, and machine learning. (4) Changes in global demographics (world population, density, ethnicity, education level, and other aspects of the human population) will bring about significant social change, and therefore, challenges and opportunities for government and business. These megatrends underpin structural shifts, technological development, shifting economic power, etc., having a profound effect on local and global markets and societies. (Peter Fisk. 2019).

In response to these big changes/megatrends the World is going towards (1) information revolution, (2) flexible & learning organizations and innovation systems, (3) explosion of skills, knowledge, and competencies, (4) improving systems of creation, production, and distribution, (5) usage and expand of innovation systems, creativity, and quality management culture, etc.

#### **1.5. QUALITY AND CULTURE OF QUALITY**

The core definition of quality, as a group of values that helps on how improvement is done on the daily practice of works and outputs related, a group of applications taken for granted that forms the philosophy of organizations or working groups, has been identified by several authors, which in paraphrasing that has defined quality

culture as “social attack that supports people in the organization to stay together” (Robbins, 1999).

Products and services features and improvement of them thrive. This is a culture expressed in several issues: (1) improvement individually, (2) tolerance and respect, (3) entrepreneurship (4) having proven capacity.

“Culture of quality is a group of common, respected and integrally formed approaches of features of products and services, identified on the culture of organizations and systems of management” (Vlăsceanu, Grünberg & Pârlea, 2007).

“The importance of quality culture, quality management culture on doing business, achieving competitive advantage, relating them with corporate social responsibility, sustainable business, business ethics, diversity issues, international, cross-cultural management, national/international organizational culture, culture and sectors of the economy in a country, as well as currently as an important part of history of economic thought (related to business management culture)” (Gordon and Owen, 2008), (Harvey and Stensaker, 2008), (Schein, 2010, 2013).

ISO standards, their importance, their use of them in practice, etc. have been described in several publications (Harrington & Mathers, 1997).

Main ISO standards required then most currently are:

- ISO 9000 Family – Quality management system
- ISO 10244:2010- Document management — Business process baselining and analysis
- ISO 14000 – Environment protection
- ISO 20000 – Information technology
- ISO 22301:2019- Security and resilience — Business continuity management systems — Requirements
- ISO 27000 – information security management
- ISO 45000 – Health and safety at work
- ISO 50000 – Energy efficiency

- ISO 56002:2019 - Innovation management — Innovation management system — Guidance Etc.

According to ISO, there are three main types of benefits from using standards (ISO, 2014):

**Key benefit 1: Streamlining internal operations**

One main finding is that standards can be used to streamline the internal processes of a company, for example by reducing the time needed to perform specific activities in the various business functions, decreasing waste, reducing procurement costs, and increasing productivity. The case studies consistently report that the contribution of standards to the gross profit of companies ranges between 0.15 % and 5 % of the annual sales revenues.

**Key benefit 2: Innovating and scaling up operations**

Some case studies provide examples where standards served as the basis for innovating business processes, allowing companies to expand their suppliers' network or to introduce and manage new product lines effectively. In other instances, standards helped mitigate the risk to companies of introducing new products onto national markets.

**Key benefit 3: Creating or entering new markets**

Standards have been used as the basis for developing new products, penetrating new markets (both domestic and export), supporting the market uptake of products, and even creating markets. In exceptional cases, the impact of standards far exceeded the figure mentioned above, with companies achieving a gross profit contribution of up to 33 % of their annual revenue, which helped them position themselves as leaders in their field, at least over a certain period (ISO. 2014).

## 2. RESEARCH FRAMEWORK, THE PURPOSE OF THE CASE STUDY

The framework of the research has been the level of innovation and business sophistication and relations between them in a global entrepreneurship ecosystem.

Given the lack of numerical, statistical, and algebraic arguments on the relations between innovation and business sophistication, this study adopts a theory-building mode and aims to investigate the following research questions:

- 1 RQ1: There is any relation between innovation and business sophistication?
- 2 Based on this, two hypotheses have been built:
- 3 Ho: There is no connection between Innovation and business sophistication.
- 4 H1: There is a connection between Innovation and Business sophistication.

... considering that, there are few types of research on relations between innovation and business sophistication, listed in the literature review of this paper research, and considering that theoretical approaches to relations between innovation and business sophistication exist, but numerical, statistical, and algebraic arguments on relations between innovation and business sophistication don't exist.

## 3. METHODOLOGY

Specifically, while acknowledging the importance of innovation, business sophistication, and quality management in doing business and entrepreneurship ecosystem, prior empirical research does not explain how innovation and business sophistication influence and connect quality management, besides the fact that few serious theoretical studies are showing the strong connection between innovation and business sophistication, but not numerical, statistical and algebraic studies. Thus, a theory building is needed, supported by analysis and evidence. An exploratory approach should be adopted using a single in-depth case study approach, appropriate for building an in-depth understanding of a phenomenon and allowing closer investigation of theoretical constructs.

### 3.1 CASE SELECTION

The case was selected based on three main criteria: a theoretical approach, suitability of relations, and practical positive impacts on relations

between innovation and business sophistication, considering innovation as a property of the ISO 56000 family of standards.

The case project ran in stages: (1) identifying needs for innovation and business sophistication, (2) identifying needs for quality management, and (3) identifying the rank of the countries for innovation and business sophistication.

**DATA COLLECTION**

Data for innovation has been gathered from the Global Innovation Index Report 2021 (World Intellectual Property Organization, 14<sup>th</sup> Edition). The Global Innovation Index (GII) is an annual ranking of countries by their capacity for, and success in, innovation.

Data for business sophistication has been gathered from the Global Innovation Index Report 2021 (World Intellectual Property Organization, 14<sup>th</sup> Edition) too.

**DATA ANALYSIS**

1. Worldwide data about innovation was taken from the Global Innovation Index Report 2021 (World Intellectual Property Organization, 14<sup>th</sup> Edition)
2. Worldwide data about business sophistication was taken from the Global Innovation Index Report 2021 (World Intellectual Property Organization, 14<sup>th</sup> Edition).
3. Descriptive statistics for the Innovation index and Creativity output and a correlation and regressive analysis (inferential statistics) between Innovation Index and Business sophistication for 132 countries worldwide were performed.

**RELATIONS BETWEEN INNOVATION AND BUSINESS SOPHISTICATION (132 COUNTRIES WORLDWIDE)**

*Table 1. Innovation index and Business sophistication ranking (GII, 2021)*

| No | Country     | Innovation Index | Business Sophistication Index |
|----|-------------|------------------|-------------------------------|
| 1  | Switzerland | 1                | 4                             |
| 2  | Sweden      | 2                | 1                             |
| 3  | USA         | 3                | 2                             |
| 4  | UK          | 4                | 21                            |
| 5  | Rep Korea   | 5                | 7                             |
| 6  | Netherlands | 6                | 5                             |
| 7  | Finland     | 7                | 6                             |
| 8  | Singapore   | 8                | 3                             |
| 9  | Denmark     | 9                | 11                            |
| 10 | Germany     | 10               | 12                            |
| 11 | France      | 11               | 19                            |
| 12 | China       | 12               | 13                            |
| 13 | Japan       | 13               | 10                            |
| 14 | Hong Kong   | 14               | 24                            |
| 15 | Israel      | 15               | 8                             |
| 16 | Canada      | 16               | 20                            |
| 17 | Iceland     | 17               | 18                            |
| 18 | Austria     | 18               | 15                            |
| 19 | Ireland     | 19               | 17                            |
| 20 | Norway      | 20               | 23                            |
| 21 | Estonia     | 21               | 29                            |
| 22 | Belgium     | 22               | 16                            |
| 23 | Luxembourg  | 23               | 9                             |
| 24 | Czech Rep.  | 24               | 25                            |
| 25 | Australia   | 25               | 26                            |

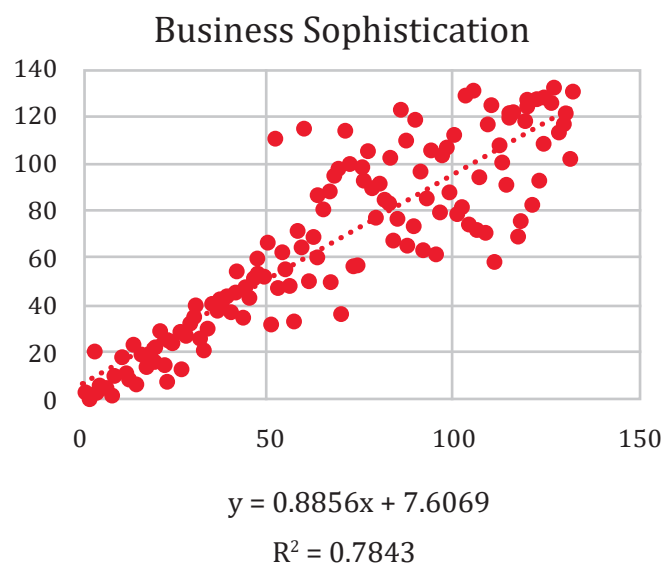
A REGRESSIVE ANALYSIS OF RELATIONS BETWEEN INNOVATION AND BUSINESS SOPHISTICATION UNDER A QUALITY MANAGEMENT HOLISTIC APPROACH

|    |              |    |     |
|----|--------------|----|-----|
| 26 | New Zealand  | 26 | 30  |
| 27 | Malta        | 27 | 14  |
| 28 | Cyprus       | 28 | 28  |
| 29 | Italy        | 29 | 32  |
| 30 | Spain        | 30 | 35  |
| 31 | Portugal     | 31 | 41  |
| 32 | Slovenia     | 32 | 27  |
| 33 | UAE          | 33 | 22  |
| 34 | Hungary      | 34 | 31  |
| 35 | Bulgaria     | 35 | 42  |
| 36 | Malaysia     | 36 | 39  |
| 37 | Slovakia     | 37 | 43  |
| 38 | Latvia       | 38 | 40  |
| 39 | Lithuania    | 39 | 45  |
| 40 | Poland       | 40 | 38  |
| 41 | Turkey       | 41 | 46  |
| 42 | Croatia      | 42 | 55  |
| 43 | Thailand     | 43 | 36  |
| 44 | Viet Nam     | 44 | 47  |
| 45 | Russian Fed. | 45 | 44  |
| 46 | India        | 46 | 52  |
| 47 | Greece       | 47 | 60  |
| 48 | Romania      | 48 | 54  |
| 49 | Ukraine      | 49 | 53  |
| 50 | Montenegro   | 50 | 67  |
| 51 | Philippines  | 51 | 33  |
| 52 | Mauritius    | 52 | 111 |
| 53 | Chile        | 53 | 48  |
| 54 | Serbia       | 54 | 63  |
| 55 | Mexico       | 55 | 56  |
| 56 | Costa Rica   | 56 | 49  |
| 57 | Brazil       | 57 | 34  |
| 58 | Mongolia     | 58 | 71  |
| 59 | N. Macedonia | 59 | 65  |
| 60 | Iran         | 60 | 115 |
| 61 | South Africa | 61 | 51  |

|    |               |    |     |
|----|---------------|----|-----|
| 62 | Belarus       | 62 | 69  |
| 63 | Georgia       | 63 | 61  |
| 64 | Moldova       | 64 | 87  |
| 65 | Uruguay       | 65 | 81  |
| 66 | Saudi Arabia  | 66 | 89  |
| 67 | Colombia      | 67 | 50  |
| 68 | Qatar         | 68 | 96  |
| 69 | Armenia       | 69 | 98  |
| 70 | Peru          | 70 | 37  |
| 71 | Tunisia       | 71 | 114 |
| 72 | Kuwait        | 72 | 100 |
| 73 | Argentina     | 73 | 57  |
| 74 | Jamaica       | 74 | 58  |
| 75 | Bosnia & Hrzg | 75 | 99  |
| 76 | Oman          | 76 | 94  |
| 77 | Morocco       | 77 | 105 |
| 78 | Bahrain       | 78 | 90  |
| 79 | Kazakhstan    | 79 | 78  |
| 80 | Azerbaijan    | 80 | 92  |
| 81 | Jordan        | 81 | 85  |
| 82 | Brunei        | 82 | 84  |
| 83 | Panama        | 83 | 103 |
| 84 | Albania       | 84 | 68  |
| 85 | Kenya         | 85 | 77  |
| 86 | Uzbekistan    | 86 | 123 |
| 87 | Indonesia     | 87 | 110 |
| 88 | Paraguay      | 88 | 66  |
| 89 | Cabo Verde    | 89 | 74  |
| 90 | Tanzania      | 90 | 119 |
| 91 | Ecuador       | 91 | 97  |
| 92 | Lebanon       | 92 | 64  |
| 93 | Dominic.Rep   | 93 | 86  |
| 94 | Egypt         | 94 | 106 |
| 95 | Sri Lanka     | 95 | 62  |
| 96 | El Salvador   | 96 | 80  |
| 97 | Trnd & Tbg    | 97 | 104 |



|     |               |     |     |
|-----|---------------|-----|-----|
| 98  | Kyrgyzstan    | 98  | 107 |
| 99  | Pakistan      | 99  | 88  |
| 100 | Namibia       | 100 | 112 |
| 101 | Guatemala     | 101 | 79  |
| 102 | Rwanda        | 102 | 82  |
| 103 | Tajikistan    | 103 | 129 |
| 104 | Bolivia       | 104 | 75  |
| 105 | Senegal       | 105 | 131 |
| 106 | Botswana      | 106 | 73  |
| 107 | Malawi        | 107 | 95  |
| 108 | Honduras      | 108 | 72  |
| 109 | Cambodia      | 109 | 117 |
| 110 | Madagascar    | 110 | 125 |
| 111 | Nepal         | 111 | 59  |
| 112 | Ghana         | 112 | 108 |
| 113 | Zimbabwe      | 113 | 101 |
| 114 | Côte d'Ivoire | 114 | 91  |
| 115 | Burkina Faso  | 115 | 120 |
| 116 | Bangladesh    | 116 | 122 |
| 117 | Lao           | 117 | 70  |
| 118 | Nigeria       | 118 | 76  |
| 119 | Uganda        | 119 | 118 |
| 120 | Algeria       | 120 | 124 |
| 121 | Zambia        | 121 | 83  |
| 122 | Mozambique    | 122 | 127 |
| 123 | Cameroon      | 123 | 93  |
| 124 | Mali          | 124 | 109 |
| 125 | Togo          | 125 | 128 |
| 126 | Ethiopia      | 126 | 126 |
| 127 | Myanmar       | 127 | 132 |
| 128 | Benin         | 128 | 113 |
| 129 | Niger         | 129 | 116 |
| 130 | Guinea        | 130 | 121 |
| 131 | Yemen         | 131 | 102 |
| 132 | Angola        | 132 | 130 |



Graphic 1. Correlation between Innovation index and Business sophistication (drawn by authors, using GII 2021 data) where at X axes is the innovation index and at Y axes is business sophistication

| SUMMARY OUTPUT               |          |
|------------------------------|----------|
| <i>Regression Statistics</i> |          |
| Multiple R                   | 0.885611 |
| R Square                     | 0.784307 |
| Adjusted R Square            | 0.782648 |
| Standard Error               | 17.83218 |
| Observations                 | 132      |

| ANOVA      | <i>df</i> | <i>SS</i> |
|------------|-----------|-----------|
| Regression | 1         | 150314.8  |
| Residual   | 130       | 41338.25  |
| Total      | 131       | 191653    |

| Coefficients                 | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|------------------------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept<br><b>b</b>        | 7.61           | 3.1    | 2.44    | 0.016     | 1.43      | 13.8        | 1.43        |
| Innovation Index<br><b>a</b> | 0.89           | 0.04   | 21.7    | 3.94E-45  | 0.81      | 0.97        | 0.80        |

$$Y = ax + b$$

$$y = 0.8856x + 7.6069$$

$$R^2 = 0.7843$$

$$r = 0.885611$$

**With these results, we have verified that There is a connection between Innovation and Business sophistication (Hypothesis 1).**

- Implications for theory and practice

About the theory, based on the final results of this research, a new window has been opened for further research on the field of relations between innovation and business sophistication, considering them as a tool for a stronger competitive advantage approach for individual businesses and as a country's economy too.

In terms of practice, the new shape of organizations as part of innovation processes has shown up currently, accompanied worldwide by new and improved products and services, as well as new business models, and besides other factors, the ISO 56000 family (innovation) helps organizations significantly improve their ability to survive in our changing and uncertain world, and allow them to permanently reinvent themselves.

- Limitations and further research

This research has been undertaken using plenty of data about the Innovation index and Business sophistication for the period of 2021.

Further research is needed to verify if these relations exist for other periods.

## CONCLUSIONS AND RECOMMENDATIONS

1. Towards fixedness of natural resources and restrictions on boundless economic growth approach, the direction of innovation and creativity is important in overcoming resource constraints.
2. There is a tendency for innovations to save on scarce resources. If technological progress will be fixed-factor saving, then fixed factors may not be a large barrier to growth. The same argument and logic can be applied to business sophistication and quality management, since both of them are not fixed resources, and are strongly connected with innovation.

| MS       | F        | Significance F |
|----------|----------|----------------|
| 150314.8 | 472.7079 | 3.94E-45       |
| 317.9865 |          |                |
|          |          |                |

3. Achieving competitive advantage requires a positive approach towards innovation, business sophistication, and quality management requiring improvement of innovation, business sophistication, quality management, and business climate in SMEs, seeing this as a general microeconomic perspective too, while, in a broader context, this study extends the general understanding of the innovation, business sophistication, and quality management relations to be used for a future managerial approach/mechanism in real-world situations, suggesting future research could focus on developing and validating the proposed framework and investigate the issue in more contexts and settings.
4. There is a strong connection between the Innovation index and Business sophistication, not only in theoretical aspects but verified through a regressive analysis.
5. Application of ISO standards generally and the application of ISO 56000 family of standards helps companies to strengthen their commitment to their clients, improving innovation and business sophistication activities, processes and procedures, and economies worldwide to achieve a competitive advantage.
6. The new shape of organizations as part of innovation processes has shown up currently, accompanied worldwide by new and improved products and services, as well as new business models, and besides other factors, the ISO 56000 family (innovation) helps organizations significantly improve their ability to survive in our changing and uncertain world, and allow them to permanently reinvent themselves.
7. The success of businesses is dependent on effectiveness, efficiency, and intensity of innovation, a decisive condition of competitive advantage.
8. Innovation is an instrument of development that plays an increasingly important role in global trade, and economies of scale are gradually being replaced by an innovation economy focused on high-value-added products and services.
9. Business sophistication is conducive to higher efficiency in the production of goods and services. This leads, in turn, to increased productivity, thus enhancing a nation's competitiveness. Business sophistication concerns the quality of a country's overall business networks as well as the quality of individual firms' operations and strategies. The quality of a country's business networks and supporting industries, as measured by the quantity and quality of local suppliers and the extent of their interaction, is important for a variety of reasons. When companies and suppliers from a particular sector are interconnected in geographically proximate groups ("clusters"), efficiency is heightened, greater opportunities for innovation are created, and barriers to entry for new firms are reduced. Individual firms' operations and strategies (branding, marketing, the presence of a value chain, and the production of unique and sophisticated products) all lead to sophisticated and modern business processes.
10. Improvement in business sophistication triggers innovation capacity and supports macroeconomic stability. Innovation capacity would also need to be expanded in the long run, which positively leads to advanced business sophistication that has a cyclical effect. If policymakers intend to accelerate business sophistication, then their attention should be directed toward maximizing the economic indicators in the long-run.

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## **STRATEGIC ENTREPRENEURIAL RESPONSES TO ECONOMIC, SOCIAL, POLITICAL AND TECHNOLOGICAL ENVIRONMENT – A LITERATURE REVIEW**

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### **ABSTRACT**

The purpose of the paper is to critically evaluate and synthesize the existing body of completed and recorded work produced by researchers, scholars and practitioners in the field of business strategy, with a particular emphasis on investigating the strategic responses, including changes in the strategies, structures and cultures, to name a few, applied by companies in response to changes in the global business environment. The business environment in the 21st century has become very dynamic and keeps on changing over time. The market has been characterized by a high level of uncertainties that managers need to respond quickly if their companies are to survive in the market. The Literature Review was obtained by analysing relevant journal papers that discuss the main developments and current debates in the field, from 2016 and on. In this regard, Business Source Complete (EBSCO), ABI/Inform Collection (ProQuest), ScienceDirect, and Google Scholar databases were queried. As a contribution to the literature, the paper will highlight the strategic responses that companies can develop to survive and outperform competitors in an uncertain and turbulent environment.

**Keywords:** Strategy, entrepreneurship, external influences, dynamic business environment, innovation

### **1. INTRODUCTION**

All businesses worldwide are subjected to a dynamic business environment; what differentiates them is how each implement and adopts strategies to cope with change. The business environment entails all the factors existing beyond the organization's control and can affect part or whole operations of the organization. It is a consistently dynamic circumstance that creates challenges for corporate management (Sushil, 2016). Organizations rely on the external environment for inputs that they internally convert into outputs. They are dependent on the external environment for growth and realization of objectives. Akhtar (2018) noted that companies must implement an effective strategic performance measurement (SPM) system in a volatile and complex business environment to ensure flexibility and achieve whatever objectives they seek.

The global business environment is always

showing signs of change, and organizations have no power over it. The external business environment is characterized by volatility associated with globalization, government policies, deregulation of the business sector, and changing consumer and speculator demands. Various scholars have focused on external factors since they have a massive impact on a firm goal setting. As a result, organizations are increasingly required to move past addressing existing issues to persistently responding to evolving conditions. Organizations need to adopt a strategic approach to manage such factors to ensure survival and competitiveness.

Companies are facing dynamic challenges in the 21st century. In the globalized business environment, organizations require strategic thinking, and only by adopting sustainable business strategies can they achieve strategic competitive advantage. Companies use strategy to generate

and implement plans to compete successfully. Nudurati et al. (2021) stressed that strategic management and measurement of strategic management performance are imperative for molding, directing, and aligning an organization effectively with its environment. Binti and Ismail (2018) stress that strategic decision-making is at the heart of the business and its environment alignment process. This can only be achieved through the formulation of business policies and organization theory.

Literature Review was obtained by analysing relevant journal papers that discuss the main developments and current debates in the field, from 2016 and on. In this regard, Business Source Complete (EBSCO), ABI/Inform Collection (ProQuest), ScienceDirect, and Google Scholar databases were queried. As a contribution to the literature, the paper will highlight the strategic responses that companies can develop to survive and outperform competitors in an uncertain and turbulent environment.

## **DYNAMIC BUSINESS ENVIRONMENT**

The external environment is the most crucial factor since organizations cannot change or control its components. Instead, an organization must change its plans, goals, and policies to align with changes in the general environment (Bruijl, 2018). It is emphasized that, since the business environment is frequently changing, organizations must continuously adjust to achieve their goals and objectives. Companies must constantly update their strategies to remain competitive and constantly learn and re-orient themselves to the dynamic environment (Fainshmidt et al., 2019). The process of adapting to the changing environment should be deliberate and coordinated to achieve gradual realignment with the external environment and result in performance improvement and effectiveness. Failure to effectively adapt to changes in the environment can result in strategic problems that might lead to business failure (Fainshmidt et al. 2019). In the supposedly highly competitive and complex environment, the success of an organization lies in its effectiveness in combining its internal re-

sources to conform to environmental conditions, thus enhancing its performance. The global business environment consists of several factors influencing how companies operate and implement their strategies to remain competitive.

## **2.1 ECONOMIC ENVIRONMENT**

The economic environment is an important contributor to the dynamicity of the business environment since it has a significant impact on the performance of a company (Hrechyshkina & Samakhavets 2019). The economic climate entails all the economic factors that influence consumers' purchasing behaviors and how businesses operate, impacting organizational performance. It consists of various factors beyond the control of the company, and therefore it is imperative to align internal operations with these factors to ensure effectiveness in performance and competition (Kapitsinis 2019). While companies cannot control the economic environment, they can assess the economic conditions before entering a particular market or industry. Critical economic factors, which affect global companies, are employment rate, gross domestic product, inflation, and government monetary and fiscal policies.

The economic, environmental factors have an immediate impact on business operation, and therefore, companies must evaluate the economic environment and implement strategic responses to deal with these factors. For example, demand and supply is an important economic factor that directly impacts the company's success. The customers' income is an essential factor to consider since it affects the demand for its product. The income level also indicates the ability of consumers to purchase products and services offered by the company. An organization must evaluate the purchasing power of customers and understand the products that consumers are willing to buy. The economic environment may constrain or provide opportunities for business growth. For example, Martin et al. (2021) noted that the covid-19 pandemic increased unemployment rates and poverty, affecting many businesses worldwide. Factors such as unemployment can directly influence the demand and



supply of products, thus affecting company performance.

Another important economic factor that affects companies is government and banking monetary and fiscal policies. The banking sector regulates budgetary policies that impact the business and also consumers' purchasing behavior. For example, money in circulation has a direct influence on consumer demand and purchasing power. In addition, banking regulates loans and the borrowing capacity of consumers and companies, affecting how they operate. Government and banking policies influence interest rates and have an overall effect on the prices of goods and services and investment opportunities (Li, Sun & Chen, 2020). Monetary policies of a particular country influence the economic activities and inflation rate together with the GDP and recession. Collectively, this dynamic situation is referred to as the "monetary policy transmission mechanism" (Can, Bocuoglu & Can, 2020)

## **2.2 SOCIAL ENVIRONMENT**

The social environment consists of attitudes, values, customs, traditions, and lifestyles of the people within the society the company operates. Such factors influence customers' purchasing behavior and are hard to predict or measure since they can be very intuitive (Tur-Porcar, Roig-Tierno & Mestre, 2018). In strategic planning, companies cannot ignore the components of the social environment since, although they may not have an immediate impact, they have a significant long-term impact on the business and its operations. Evaluating social factors in a particular business environment is important because it allows companies to forge a cordial relationship with their customers (Dewnarain, Ramkissoon & Mavondo, 2019). It is evident that society is continually changing; lifestyle changes in fashion and preferences are great examples of this change (Ben, Udo & Abner, 2019). One of the most significant social changes affecting businesses is the increasing popularity of social media. Social media sites such as Facebook and Instagram have become very popular among young consumers as a source of information and

recommendation about products (Corrada, Flecha & Lopez, 2020).

Businesses must understand the social needs and preferences of their consumers to stay competitive. For example, young consumers prefer digital technology to shop online, while older consumers are more likely to stick to conventional methods (Corrada, Flecha & Lopez, 2020). Companies must focus on social changes extensively to achieve their goals. To evaluate social changes, they use various analyses such as PESTLE, STEEP, and STEEPLE analysis to get a comprehensive understanding of social and cultural changes and how such factors might impact the business operations (Paurova & Gregova 2020). To ensure a sustainable competitive advantage, companies should provide products and services that satisfy or accommodate the social needs of their customers. The products should complement the behavior of the customer. Failure to effectively respond to societal changes can have several consequences, such as reduced market share and a fall in demand for products and services (Lüdeke-Freund et al. 2017).

## **2.3 POLITICAL ENVIRONMENT**

The political environment is another fundamental element for managers to consider in daily business operations. It involves government regulation and consists of three important components: government activity, policies, and government stability. The government regulates the production and economic aspects, and government policies and guidelines significantly impact business operations (Aithal 2017). In all countries, governments and other authorities implement business policies and regulations to facilitate smooth trade activities. They determine what activities an organization can engage in and how much money they can borrow, thus significantly impacting businesses (Kim et al. 2021). The political stability of a country has a significant impact on business planning. Often, managers evaluate the political climate of a country before setting business. For example, companies must consider the stability of the government, government regulations on foreign

companies, import tariffs, and other restrictions (Aithal 2017). Political factors are highly volatile and can experience drastic changes, especially during elections years and other phenomena. For example, the recent global pandemic forced governments to impose lockdowns and travel restrictions, significantly impacting the global business environment (Ratten 2020). Changes in response to the pandemic have revolutionized businesses as more are using internet technology and work-from-home culture.

A stable political environment facilitates business growth and attracts local and foreign investors. Businesses are always wary of the political and legal factors since they are important determinants of the business environment. For companies to be legally fit to operate, they dedicate entire departments to legal issues, while small companies hire legal experts for directions.

### **2.5 TECHNOLOGICAL ENVIRONMENT**

The technological environment is a crucial component of the global business environment and refers to the methods used to convert raw materials into finished products and services. It involves using new machines and technology to improve production, minimize wastage, and increase the value of the final product (Tallman, Luo & Beckley, 2018). Such technology comes from the external environment, and businesses must closely monitor technological changes in a particular industry. Companies must implement technical changes to remain competitive in the market. For example, digital technologies have been adopted in recent years as more business transactions are conducted through the internet.

Emerging technologies such as artificial intelligence, warehouse automation, and social media marketing are imperative for businesses' survival in the current era (Chan 2020). Companies that adopt new technologies can improve customer experience, which relates to long-term sustainability. New technologies promote large-scale production and boost efficiency by reducing waste and the cost of production. Some aspects of the technological environment are scientific

improvements, development of information technology, and import and export technologies. Such technologies improve global trade and attract foreign investors since they ease the ways of doing business.

### **3. HOW COMPANIES BEHAVE UNDER DIFFERENT TYPES OF EXTERNAL INFLUENCES?**

Strategic responses are decisions and actions that formalize and execute the designed plan to achieve business objectives and goals. Strategic responses enhance long-term business survival while also ensuring that firms remain relevant and competitive in the environment they operate. Strategic responses are usually long-term as they determine the future direction of the firm in addition to being dependent on the business environment (Ansoff et al. 2018). Therefore, firms tend to adopt response strategies that fit the business environment and which the internal resources can support. The ever-changing global business environment requires firms to develop new strategies aligned to the factors within the environment. Strategic responses, therefore, have a direct impact on business performance both in the short term and long term. Strategic responses also enable firms to adapt and adjust to environmental factors, which significantly contributes to attaining the set business goals and objectives. Strategic responses act as standard measures that firms use to remain competitive. Business entities constantly seek to formulate strategic responses to counter dynamic forces within the environment to gain a competitive advantage.

Companies operating in large global markets are faced with various external factors that trigger strategic responses to ensure sustainable competitive advantage. In such situations, business managers and decision-makers need to implement strategies aligned to the respective factors or challenges within the external environment. Various studies have identified strategies such as outsourcing, downsizing, reengineering and self-management as some of the traditional approaches adopted by firms to respond to

changes in the external environment (Carrie et al. 2017, P.138). As asserted by various scholars on this topic, the management approach used by a company is a key determinant factor in how the management sees the business environment, diagnoses its impact on the business, identifies the suitable strategy, and implements the strategy. When faced with changes in the external environment, the main response has to involve cost minimization. The overall strategy should contribute to minimum cost or loss while maximizing profitability to succeed in a turbulent and volatile environment. The highly competitive and uncertain business environments that global companies operate in mean that strategic thinking and effective change management are key sources of competitive advantage in a sustainable business environment (Lin et al. 2018). There is a need for the firm to ensure a real-time response to strategic issues, which enhances preparedness to mitigate impending risks that may affect business performance and growth. Strategic response means that the firm is capable of adapting to the needs in the business environment.

According to Lin et al (2018), the ability of a firm to conform to current and diverse factors is known as flexibility. A flexible company can maintain business operations in changing conditions irrespective of their uncertainty or difference from the pre-existing environment. A strategic response is critical in highly competitive business environments because the existing sustainability strategies for competitive advantage are limited to certain conditions (Chen 2019). After a strategic analysis of the business environment, the firm can identify the appropriate competitive approaches to maximize available market opportunities. Some strategies that can enable firms to achieve cost leadership include overhaul reduction, cost minimization, and efficiencies.

After analyzing the market environment, a firm must identify the appropriate direction to grow and whether it is strategic to expand internally or externally. The internal expansion entails increasing a firm's internal capabilities, such

as production, distribution, and marketing resources. External growth is a strategic response that has been widely applied by companies operating in the highly volatile global environment (Ansoff et al. 2018). It entails expanding business operations through mergers, acquisitions and takeovers. Restructuring and rationalizing is another way firms can strategically respond to changes in the global business environment. Restructuring is concerned with actions and decisions that are meant to achieve business purposes and objectives. Decision making is part of a firm's overall strategy, as it plays a critical role in identifying challenges in a business environment (Koentjoro and Gunawan 2020, P. 90). The three main components of a company's strategy include the objective, vision and mission, and competitive strategy. The objective strategy entails short term and long term goals. The mission strategy defines the strategic direction in terms of the business activities that the company focuses on.

The competitive strategy relates to considering the company's competitive strengths and weaknesses depending on customer needs and competition, which helps establish a sustainable competitive advantage. As a response to changes in the global environment, firms can opt to review the above three core company strategies. Global companies tend to find it difficult to understand the external environment because of various factors. First, the external environment is characterized by diverse factors that affect the business. Although it might be easier to identify various external factors within the business environment, it isn't easy to select one factor that has the greatest impact. Secondly, external factors such as technology are subject to rapid change, thus becoming more difficult to understand. Business leaders and managers struggle to keep up with the speed of technological advancement.

Thirdly, external environment factors are difficult to identify because of complexity. The external environment is difficult to simplify as business leaders try to understand the history of factors and how they are applicable in future. A

strategic response is directly linked to uncertainty in the global environment (Koentjoro and Gunawan 2020, P. 90). As the external environment grows more volatile and uncertain, firms need to become more flexible to respond to emerging issues strategically. Flexibility comprises various aspects, including agility, adaptability, elasticity, corrigibility, versatility, hedging, robustness, liquidity, resilience, plasticity and malleability. Each of these firm flexibilities responds to some kinds of external pressures and uncertainties in the external environment. The type of response can be defensive or offensive, depending on the external environment. Although flexibility is usually considered the main adaptive response to uncertainty in the external environment, firms need to use their strategic responses to review market uncertainties to regain sustainable competitive advantage

## CONCLUSIONS

The global business environment is complex and volatile and is characterized by many changes that influence how organizations operate. To cope with the rapidly changing environmental factors, firms must adopt and implement strategies to gain and maintain a competitive advantage. In this theoretical review, various aspects of the global business environment have been explored. Firstly, the study analyzed the multiple components of the worldwide business environment, including social, political, economic, and technological, and how various factors contribute to the dynamicity of the worldwide business environment. In essence, the review has endeavored to answer how various aspects of the global business environment influence dynamicity and how firms respond to such factors to achieve and maintain a competitive advantage. Secondly, the review explored multiple strategies adopted by companies worldwide to react to changes in the volatile and competitive business environment. Since companies have no control over the external business environment, they can adopt various strategies such as market-based strategies, product-based strategies, and operational-based strategies to cope with changes in the

external business environment. In essence, the overall objective of adopting these strategies in a volatile business environment is to achieve and maintain a sustainable competitive advantage.

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## EXAMINING THE INNOVATION AND INTRAPRENEURSHIP DRIVERS: THE CASE OF ALBANIA

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### ABSTRACT

This study provides an analysis of the situation of Albanian companies in dealing with implementing innovative strategies and the internal work environment in relation to innovation support. Intrapreneurship has recently been introduced into economics and business strategies which is why this study is being conducted to evaluate how prepared are employees in Albanian companies to apply innovative ideas to improve the life of companies. The main aim is to investigate how active Albanian companies are with innovation and intrapreneurship aspects. This research paper analyses five different aspects that cover both intrapreneurship and innovation in companies in Albania, including top management support, work discretion/autonomy, rewards/reinforcement, time availability, and organizational boundaries.

**Keywords:** intrapreneurship, innovation, leadership, motivation, work environment.

### 1. INTRODUCTION

Innovation has changed the world around us, through every aspect that we deal with. It has made our lives more efficient and convenient in more ways than one. Whether it be through school and study, work, health, and everyday tasks innovation is the source of it all. However, innovation does not come alone. It is studied that innovation is an output of an entrepreneurship mindset and that they enhance one another for better outcomes in the market, inside the business, and overall profits made. According to Drucker (1985), for economists, entrepreneurship is a “meta-economic” event, something that profoundly influences and indeed shapes the economy without itself being part of it. And so too, for economists, is technology. The enterprise has an important role in society as it is seen as the leader of innovation. There is great significance in observing and concluding the drivers of innovation and entrepreneurship for they can foretell and give many answers about the economic situation in Albania. The research question for this study is: are Albanian domestic companies offering enough support for organi-

zational innovation and intrapreneurship? The main objective of this study is to explore how the sources of innovation for intrapreneurs are managed within domestic companies. There is a lack of information on such topics in the Albanian context for innovation and intrapreneurship and through this study, there are new insights discovered about Albanian innovation trends.

The way this paper was carried out was by providing a detailed literature review on topics such as intrapreneurship and innovation. The methodology portion explains how the measurement instrument (survey) that was developed by Kuratko, Hornsby and Covin (2014) was used to measure the promotion and support of an environment for innovation.

### 2. LITERATURE REVIEW

The different drivers and influential factors of innovation and intrapreneurship are debated by different economists and/or researchers. The intrapreneur is defined as “ a person within a large corporation who has the responsibility to develop a new product through innovation and

risk-taking (Gasper et al., 2016). The intrapreneur's compensation is linked to the success of the new product. Large companies need intrapreneurship to stay competitive and increase their chances of continued survival. Creative people within the organization can be lost to entrepreneurial opportunities that cause them to leave the firm. The benefits of staying with the firm are more security and more potential resources available than on their own as entrepreneurs (Gasper et al., 2016).

Innovation is a word we have heard time and time again due to the fact that it is responsible for the advancement of technology and making daily tasks much easier for everyone in society in a variety of work fields. According to Kuratko (2013), the process by which entrepreneurs convert opportunities (ideas) into marketable solutions is known as innovation. Ayhan (2014) states that innovation is a process where ideas, perseverance, and dedication remain all the way through the implementation of such ideas. Davila, Epstein, and Shelton (2006) have noted that for almost every organization, innovation is not only the opportunity to display growth and prosper but also the chance to dramatically impact the route of the industry. Influential factors of innovation may be interpreted differently depending on the region being researched. For example, after a study done in the USA, it was concluded that there were four drivers of innovation (Mika, 2007). The first driver of innovation is finding talent and the second driver of innovation includes managers. A manager has the role of a mentor in the company to make sure he is not only delivering the tasks but also the creative, innovative process. The third driver of innovation is relationships. In order for a company to move forward, bring new ideas, and creatively introduce them to the market, a firm needs to understand what consumers are demanding and that is only possible through good relationships with them. Lastly, the final driver that Mika (2007) concluded as an influential factor of innovation in the USA is choosing the right leaders. Thus, the study done by Mika (2007), concludes that innovation is driven by talented leaders, skilled managers, relationships with consumers and

lastly keeping and choosing the right leaders to continue the success of the company. These four drivers of innovation were very orientated towards efficient leaders being the key and less driven by the economy of the United States.

Drivers of innovation do not only depend on the region but also the type of firm. Two other types of drivers are firm-level drivers and country-level drivers. For firm-level drivers of innovation, the size and age of the firm are important. According to Acemoğlu, Akcigit and Celik (2015), a firm's will and capability to innovate will be contingent on many aspects.

Especially, newer, smaller firms are mainly observed to be the source of innovation. Truthfully, these younger firms do acquire a significant role in new products they bring, however that does not always make them more innovative compared to other types of companies. This tends to occur with smaller firms that show signs of innovation, grow rapidly, and then become larger-sized firms. For example, Google and Amazon were start-ups before their success escalated; this was due to successful innovation strategies. Start-ups that lack innovation eventually exit the market. Drucker (1990) states that another vital aspect influencing innovation is firm ownership. The contribution of local firms to the international supply chain leads to a great increase in innovation. Different decisions made by firms are related to their capability to innovate. For example, one of these capabilities is being able to compete in a global market. Aghion, Bloom, Blundell, Griffith, and Howitt (2005) claim that exporting can expose local manufacturers to tougher and first-hand rivals from foreign products, thus initiating an encouragement to innovate. Lastly, information technology was also reviewed as a firm-level driver of innovation (Aghion, et al., 2005). Firm-level drivers for innovation are greatly controlled by the size and age of a firm, the ownership structure that it was built upon, being able to compete and prosper in an international market, and lastly incorporating information and communication technology (ICT) into their firm for future success (Aghion, et al., 2005).



Country-level firm drivers for innovations use a cross-country analysis to determine and measure innovation in different fields along with other country-level characteristics, such as income per capita, financial growth, research and development involvements, and the value of human resources. In country-level firm drivers, the first aspect that is reviewed is the country's openness. Moreover, there is a positive relationship between innovation strength and the openness of the economy. Different studies propose that a country's capability to promote innovation and also to accept new technologies is very beneficial for the economy (Chinn, 2006). Another driver for country-level firms is the skills in the workforce. Although some studies have failed to find a positive correlation between innovation and the population that has completed secondary education, a greater number of years of post-secondary education is largely related to a greater output (Welsch, 2008). Firm-level and cross-country analyses have recognized a variety of influences that play an important role in the development of firms' motivations and capability to innovate. Greater openness for the firm in responsiveness to international trade and enhancing the skills of the workforce were other important factors of drivers of innovation for country-level firms. Other influences, such as improved finance and the improvement of continuation of information and communication technology (ICT) organizations, also have an important role.

Innovation can come in many forms, like invention, extension, duplication, and synthesis. An invention is a completely new product introduced to the market; an extension innovation is a new use or different presentation of an existing product, service, or process; duplication innovation is replicating an existing concept in an innovative way; lastly, synthesis innovation is a combination of existing concepts and factors into a new formulation or use (Kuratko, 2013). The way entrepreneurs are able to accomplish all they do through innovation is linked to a process. This process involves creative thinking and systematic analysis which leads to success. They then seek out unique opportunities to fill needs and demands and finally turn problems into opportunities by recognizing

that problems are to solutions what demand is to supply (Kuratko, 2013).

It is also important to analyse some factors that contribute to the development of intrapreneurs. Intrapreneurs are not only praised for their skills in business planning, and growing profits but also for their motivational and leadership qualities. Employees are expected to perform to the best of their capabilities; however, intrapreneurs know that is not always the case. Motivating and leading employees in the right direction allows the firm to reach its maximum potential resulting in positive customer feedback, employee satisfaction, and an increase in profit growth. According to (Gasper et al., 2006) employee job satisfaction and welfare are critical if firms are to provide top-notch products and customer service. However, firms need to be cautious not to go overboard since several employee-centered organizations- primarily those based on job security, non-contributory pension plans, and elaborate employee benefits-tend to become too internally focused, cost ineffective, and complacent over time with little regard to customer satisfaction. In order to prevent this from happening, managers try to motivate employees by providing various incentives that promote job satisfaction, which in turn increases productivity, improves customer service, and ultimately accelerates profit growth. Managers have always wrestled with keeping employees motivated. While some employees may be encouraged by certain incentives, others may be indifferent to them. Psychologists and economists have been studying these issues for almost a hundred years to determine how best to motivate employees and improve the work environment (Gasper et al., 2006). There are studies conducted by Gazi and Alam (2014), Sekerdil and Gunes (2020) that confirm leadership behavior contribute to the potential of creating intrapreneurs. Leadership is known as the development of influence given to society or a specific group of individuals; however effective leadership involves adapting to different situations successfully and using the maximum potential to accomplish the tasks/goals at hand. According to DePree (2011), the signs of outstanding leadership appear primarily

among the followers, making sure they reaching of their most potential. It is obvious that the role of innovation is to improve the life of companies and other organizations at large. Innovation is always about renewing a product/service or inventing something that solves a social problem and contributes to a solution. Companies need to have a clear vision and must be able to provide the best quality to their enterprise in order to receive the best quality in return.

### 3. RESEARCH METHODOLOGY

The purpose of this paper was to explore how the drivers of innovation and intrapreneurship of Albanian companies are used and to determine where the strengths and weaknesses related to a climate of intrapreneurship lie in Albanian companies. Intrapreneurship is a new term introduced to the internal life of companies and this paper was focused on finding how well Albanian managers encourage and accept intrapreneurship in their firms. The target population is Albanian companies and a quantitative approach was used for this study. The instrument used as a basis to collect the data was a survey developed by Kuratko, Hornsby, and Covin (2014). After the survey was delivered to the firms' managers, they were collected and analysed. In the survey five key aspects of innovation and intrapreneurship were included; management support, work discretion, rewards/reinforcements, time availability, and organizational boundaries. The answer ranged from 1-5; 1 being the least form and 5 being the greatest. The total number of surveys that were handed out to the nine chosen firms was 70 surveys. The survey used for this research covered every aspect of innovation and intrapreneurship that was key as well as the results being quantitative were constructive for making suggestions to noticeable issues within the firms. Collecting data for the five factors of innovation using the survey was very successful since it focused on key aspects with descriptive questions allowing the individuals who participated in the survey to easily understand and respond. Using quantitative research methods to analyze the data was very useful since these

kinds of studies are limited in Albania. Using the right method in research is an important aspect of data collection since it is the main procedure and strategy used in order to get significant results.

### 4. RESULTS AND FINDINGS

The patterns found amongst the results for the various Albanian companies regarding innovation and intrapreneurship were: all of the companies had a mean between 2.99 (3) – 3.39. None of the means exceed the interval of 3 even if rounded, which means the average answer for the companies is “I don't know”, while the highest rank in the measurement was 5. What can be understood from this result is that the employees were not able to answer whether their company excelled in innovation and intrapreneurship in different aspects or whether the company they presented did not surpass in these areas. This kind of result allows us to conclude that there are many aspects of improvement since the overall mean was 3.17 displayed below in Table 1 below.

Table 1: Summary of Means

| Variables                               | Mean        | SD          | Median      |
|---|-------------|-------------|-------------|
| Management Support for Intrapreneurship | 3.39        | 0.71        | 3.31        |
| Work Discretion                         | 3.19        | 0.56        | 3.23        |
| Rewards/ Reinforcement                  | 3.08        | 0.42        | 3.09        |
| Time Availability                       | 3.02        | 0.50        | 3.00        |
| Organizational Boundaries               | 3.15        | 0.57        | 3.10        |
| <b>Total</b>                            | <b>3.17</b> | <b>0.55</b> | <b>3.15</b> |

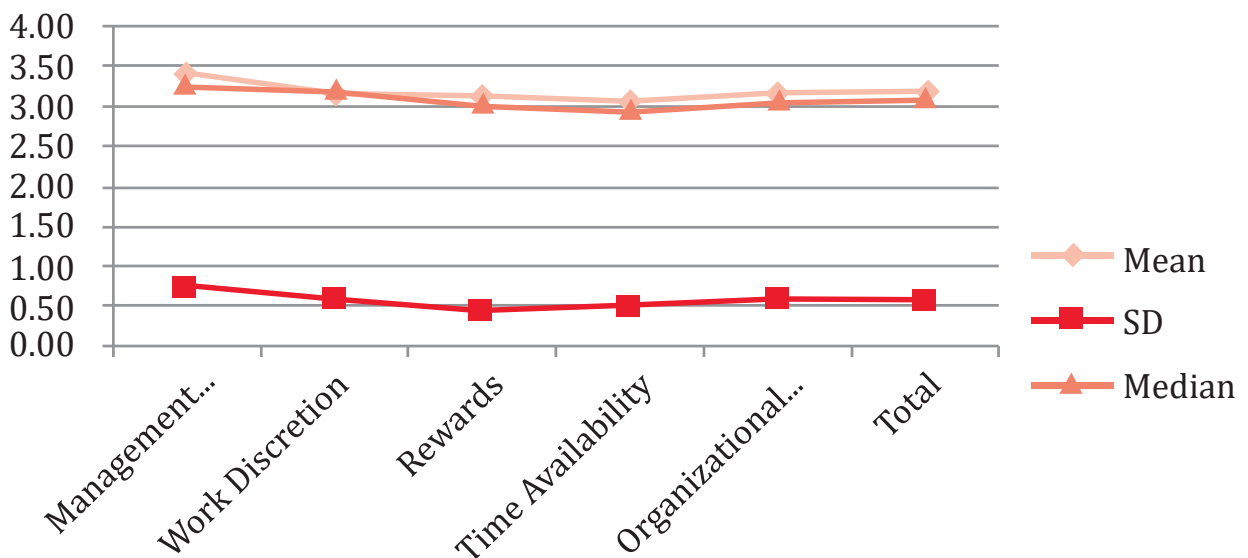
Since the overall mean also does not exceed 3.5, such as the overall means for the variables this can conclude although there is improvement in innovation and intrapreneurship needed, there is also a sense of stability since all of the mean results are constant. The average result shows that the ranking cannot be considered “good” however it cannot be considered “poor” as well. The problem may lie in the confusion that employees have due to a lack of proper regulations and rules set to follow and to explain what their tasks are and what is expected from them. To answer the research question: are Albanian domestic companies offering enough support for organizational innovation and intrapreneurship? From the data collected it is concluded that Management Support for Intrapreneurship (3.39), Work Discretion (3.19), and lastly Organizational Boundaries (3.15) are the main supported drivers of innovation and intrapreneurship in the Albanian companies.

Although the variables were all very closely related, it can be concluded that they are all contributing factors to innovation and intrapreneurship for Albanian firms. The first three variables mentioned however had a leading rank which shows that they impact the firms on a higher level of employee satisfaction, innovation, and intrapreneurship aspects. Below in Figure 1; the Mean, Standard Deviation, and Median are shown to display how similar in results they were concluded and how constant all of the data resulted.

**CONCLUSIONS AND SUGGESTIONS**

Drivers of intrapreneurship and innovation have many factors behind them. The study concluded that Management Support for Intrapreneurship, Work Discretion and Organizational Boundaries are the main supported drivers of innovation and intrapreneurship in Albanian companies. Although the variables were all very closely related, it can be concluded that they are all contributing factors in innovation and intrapreneurship for Albanian firms. The first three variables mentioned however had a leading rank which shows that they might have a higher impact on the firms’ innovation and intrapreneurship aspects.

Based on the findings revealed from this study, there is a need for more management support when it comes to increasing the level of innovation and intrapreneurship. Since management support was one of the top drivers of innovation and intrapreneurship, it would only be appropriate and effective in business environments if managers were more prepared on allowing the employees to grow instead of simply just completing a task given to them. Also, the amount of tasks/work given to employees should be calculated accordingly to the amount of time they are given to achieve them. Excessive obligations and not enough work time given can lead to an employee becoming overwhelmed and stressed which will result in a lack of innovative ideas and



a lack of leadership/intrapreneurial qualities. It was evident that a majority of the employees felt confused about whether their company was effective or ineffective regarding the support for intrapreneurship. To improve this situation, it is recommended to make the employees aware of what their position is and what they have the right, and freedom to do. Not explaining or making clear to an employee what is not only expected of them but also what opportunities they have upon them leads to unsure workers who will not only have difficulty in their tasks but will not show any growth or development. This can be resolved by encouraging the employees to participate in giving ideas and feedback whenever necessary to help improve the company as a whole. Allowing employees to feel part of the company and that they are making an impact will not only increase their confidence and work ethics but also increase innovative ideas for the firm and increase the number of intrapreneurs within the environment. Incorporating these suggestions into the Albanian firms that were researched in this paper would make a great amount of change for not only the companies but for the stakeholders as well.

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**BIOGRAPHIES**

Dr. Blendi Shima is a lecturer at the Canadian Institute of Technology. Dr. Shima has a PhD and DBA in Business Administration from SMC Business School and the University of Central Nicaragua. His research interest relates to business information systems, business strategies, innovation, and entrepreneurship. He is part of various journal editorial boards, locally and internationally, conference proceedings, and articles for scientific journals. In recognition of his work, he was awarded the “Best Researcher” award for the conference paper “Sustainable Development by Means of Community-Centered Business Practices: The Tourism Industry in Context” at the 11th International Scientific Conference of Business Faculty, “Aleksander Moisiu” University. He is a passionate observer of the entrepreneurial spirit that makes idea innovations possible.

# PROMOTING GREATER ROLE OF WOMEN AS LEADERS IN THE MACEDONIAN MARKETING SECTOR

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## ABSTRACT

Marketing as an activity that marked the 21st century is a very important part of the business activities of any organization. Traditional and modern marketing are interconnected despite digitalization as a new process. A good marketing leader is the key to success in many large companies. Leadership is a very broad concept and there are different theories and styles of leadership. This paper focuses more specifically on female leadership styles in marketing, as a concept that is becoming more interesting to study and observe. The study provides an evidence that women leaders in the Republic of North Macedonia dominantly use a participative leadership style, which also means that besides the involvement of the employee in the decision-making process, they show respect, care and empathy for others. The study also shows that there is no differences in leadership styles among the genders, which supports the feminist idea of women being equal to men; thus breaking the business and leadership stereotypes in regards to the women being less valuable in the business environment.

**Keywords:** Leadership styles, Marketing, North Macedonia, Gender, Women

## 1. INTRODUCTION

Leadership can be regarded as the term of the 21st century because if in the past having a leader in the company would have been considered as a competitive advantage, today – it is an essential for any organization, big or small. As Moldoveanu and Narayandas (2019) write “companies of all sorts realize that to survive in today’s volatile, uncertain, complex, and ambiguous environment, they need leadership skills and organizational capabilities different from those that helped them succeed in the past”. The literature is full of studies of leadership styles and theories that are being grouped by industry, behavioral characteristics and etc., however many authors suggest that there are differences in leadership based on gender. Intuitive reasoning contends that early socialization patterns give rise to diverse traits in men and women that most likely produce different leadership styles (Powell, 1993). According to Eagly and Johnson (1990) “women seem to

lead in a rather democratic way, while men show a more autocratic leadership style”. This is confirmed by newer studies as well. A study conducted by Horowitz et al (2018) states that “a majority of Americans (57%) think men and women on top positions in business and politics are different when it comes to their leadership styles”. It is important to note that the leadership style and its effectiveness is a combination of different factors and characteristics that are unique for each individual. However, it should be noted that female leadership can be an important asset for any company. A study conducted by Desvaux and Devillard (2008) conclude that “female leaders and a diversity of leadership styles can give companies a real competitive edge”.

One sector that is increasingly important in recent years is the marketing sector, as the global market becomes more competitive and the marketing experts are perceived as a possible competitive advantage. A study conducted by Kerns (2020) cited

by Harte (n.d.) states that when it comes to leadership, only “17% of marketing and ad agencies are run by women”.

The marketing industry is growing which according to Bilbo, (2021) results in more managerial and operative open positions, and this is where women’s marketers can establish themselves. The ultimate goal would be that women as leaders in the marketing sector are treated and have equal opportunities as their male coworkers. If one takes into consideration that the research of this topic is limited worldwide, it is to be assumed that in regional terms this topic is even less studied and researched.

This research was conducted in order to understand the context of the current situation of women leadership in the marketing sector.

A quantitative research method was used in order to verify the results in order to reflect objective overview of the researched topic. This approach uses numerical data analysis and data collection to characterize, clarify, forecast, or control variables and phenomena of interest. (Gay et al, 2009).

## **LITERATURE REVIEW**

### **2.1. A GENERAL OVERVIEW OF LEADERSHIP**

Leadership is a very broad concept and there are different theories and styles of leadership. This term is defined in many ways, by many authors. As a definition that is very important in terms of leadership is that of Tannenbaum & Shmit, (2000), who believe that “leadership is an interpersonal influence that is implemented in a certain situation through the process of communication, with a single goal and intention to achieve certain goals”.

Female leadership is just one branch of this concept and can be defined and understood in different ways. Many authoritative leaders understand women’s leadership as the fact that women can be and are leaders, others may define it from a feminist perspective, as a matter of equality and the right to have the same opportunities. It refers to certain female characteristics that are valued in

today’s organizations (Burns, 2021).

As such a process, leadership can also be thought of as an influential action used to achieve goals. (Yukl,2006). This process can be considered as a tool to motivate people. Motivation aims to achieve certain goals through the action of those people. Different leadership styles arise from different ways of motivating people, different types of goals and the nature of organizations (Daft et al, 2010).

### **2.2. LEADERSHIP STYLES**

The traditional literature, in line with the view of the German-American psychologist Kurt Lewin, who in 1939, identified three styles of leadership (Lewin et al, 1939), mainly discusses: the autocratic, democratic, and laissez-faire leadership styles.

Autocratic leadership style is based on centralizing power and authority in the hands of one person. The autocratic leader has unlimited power and decision-making power, controls his subordinates and is responsible for all decisions made, orders groups and individuals (Eagly & Carli, 2008).

Democratic leadership style is characterized by the involvement of subordinates in the decision-making process. Communication is two-way, motivating, both for groups and individuals; Employees are given the opportunity to express their ideas, which encourages creativity and innovation. At the heart of democratic governance is a good organizational climate and employee relations (Lewin et al., 1939).

The laissez-faire leadership style, often referred to as a delegative leadership style focuses on delegating initiative to team members. is characterized by responsibility avoidance and disclaimer. Group members are instructed to choose tasks and do what is best in the best possible and familiar way. The flow of communication is primarily horizontal; self-promotion is allowed among equal members according to one’s view of independence and the influence of the leader (Požega et al, 2013).

Likert (1932), identifies four types of leadership characteristic of certain management systems. The first type is defined as authoritarian-exploratory and is leadership where decisions are made by the leader. The second type is benevolent-authoritarian style, a type characterized by the fact that some aspects of decisions are delegated. The consultative type is the third type of leadership, where the leader leaves room for acceptance of ideas and suggestions from subordinates, while the fourth type, marked as participatory is a group type of leadership with comprehensive forms of leadership and full involvement of subordinates in decision-making processes and a comprehensive anatomy.

Other types of leadership styles have been identified throughout the years, such as: transactional and transformational leadership, which together with the charismatic type of leadership form the modern leadership model (Lowe and Gardner, 2000).

### **2.3. CHARACTERISTICS OF A LEADER BASED ON GENDER**

Female leadership is often defined by the differences between femininity and masculinity. The characteristics that are presumed to influence decision-making, problem-solving, and achievement are often compared. The purpose of this discussion is to highlight the values and benefits of women in leadership today and the benefits of diversity of organizations and businesses.

Women and men are biologically different from each other and usually culture and society shape and reinforce gender roles. The traditional role of men is to support their family and the role of women is to take care of the children and the home. Traditionally, men are considered more aggressive and women are the fairer sex. Different stereotypes about female and male characteristics and roles in society still exist and are felt (Kolb, 1997).

However, everyone has their own individual characteristics and strengths and therefore stereotypes should be avoided. By favoring men as more efficient in working life, the important and valu-

able characteristics that women possess remain underestimated. Stereotyping slows down change and can act as a major obstacle when it comes to women's career opportunities (Sherman, 2005).

There are certain characteristics of leadership that are described as feminine and masculine. Some of the characteristics that are often found in male leaders are competitiveness, focus, goal orientation, inventiveness, performance orientation and desire to be the best. Female leadership characteristics include social skills and social interaction, conversational communication style, acceptance of differences, be highly qualified and work well in groups (O'Neil et al., 2015).

These characteristics do not imply the gender of the leader; they just represent a different kind of leadership behavior that can be applied by both women and men.

Female leadership style is best described by words such as positive participation, interactions, involvement, networking, teamwork, enthusiasm, employee orientation, listening, understanding, camaraderie, spontaneity, warmth, kindness (Heim and Golant, 1993). Sharing power and information is characteristic of the "female style" of leadership. "Women leaders share information and make decisions, give positive feedback, which helps employees grow" (Adler, 1990).

### **2.4. LEADERSHIP AND MARKETING**

When reviewing the literature, it can be noted that there is very little academic research that has been conducted on the topic of the role of leadership in marketing, although marketing today represents a leading industry. But over time, leaders begin to create an opinion in the field of leadership in marketing.

Thus, sustainable marketing leadership model requires that effective leader has strategic visioning, integrated planning, managing performance and marketing controllership (Shapiro, 2005).

The connection between leadership and marketing is included in the most recently updated definition by the American Marketing Association (AMA): "marketing is the activity, set of institu-



tions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large” (AMA, 2017).

### **2.5. DIFFERENCES BETWEEN FEMALE AND MALE LEADERSHIP IN THE MARKETING SECTOR**

When it comes to leadership in marketing, it is very ungrateful to make distinctions according to gender, but only in this way can the stereotype of women in leadership positions be broken. According to the analysis made by the Ministry of Industry, Employment and Communications of Sweden (2001), both genders have their own way of managing a business and helping it grow. However, the flexibility of the marketing industry is an opportunity for women who face the challenge of balancing business and family responsibilities (Fielden et al. 2003). This is mostly due to the possibility of working from home, flexibility of the working hours and even the possibility of part-time work (Wilby, 2008). This aspect can on the other hand cause prejudices related to advancement of women, excluding them from promotion opportunities.

Using a database of 30 million profiles, research firm Zippia compiles statistics on the top marketing leaders in the United States. After extensive research and analysis, the Zippia team found that (Zippia, 2020):

- Over 68,763 chief marketing officers are working in the country right now.
- Chief marketing officers make up 32.0% of the total, while men make up 68.0%.
- An employed chief marketing officer is 38 years old on average.
- In 2021, women’s earnings were 94% of men’s earnings.

Studies also show that there are many differences in communication between men and women: women share more information about their personal lives, stick to one topic longer, use non-verbal cues less, give employees/subordinates more space to finish a sentence and try to speak includ-

ing everyone present (Cole, 2012), which are desirable traits in the marketing sector.

### **2.6. FEMALE LEADERSHIP IN MARKETING SECTOR**

Analyzing the benefits of female leadership, modern science has found that women lead less autocratically than men and have a greater sensitivity to the importance and use of human potential. It is these characteristics that are cited as the reason for the increased involvement of women in the marketing sector, diversity management, the importance of women’s management style for the business operations of modern organizations, the increased number, expertise and organization of women and the relationship between the share of women in management and organizational performance (Górska, 2016).

In the last ten years, especially in the business of marketing, new trends in business behavior have emerged that are critical to the growth, development and survival of today’s organizations. Modern organizations rely more on teamwork and a “feminine” style of communication or leadership that becomes key to success. In addition to teamwork in the modern organization, the involvement of employees in decision-making, information exchange, trust, consensus and cooperation is characteristic. These characteristics relate to female leadership and are typical of women. For these reasons, the percentage of women in management positions is increasing today. Women are better than men at multitasking, team building and communication, which in today’s business is far more important than strict formalities. The need to include women in business is increasing because teams of both genders are significantly better and more efficient at solving problems (Helgesen, 2020).

According to Marcetić, (2009), the female leader imposed the following attitudes in her work in the organization:

- respect for others (no classic stereotypes, respect for other colleagues, employees/subordinates),
- trust (because of the general belief that the

behavior and actions of others are trusted by employees),

- care (care is manifested by the fact that other people's needs exceed their own needs; by building mutual and mutual trust with colleagues and employees / subordinates, the leader contributes to the success of the organization's work and encourages motivation),
- empathy (compassion or empathy is the ability to recognize other people's feelings and in business management and marketing management it is extremely important to develop that compassion which is the basis for building quality relationships),
- Self-responsibility (any success basically involves taking responsibility for oneself and one's actions, a successful manager strives for self-responsibility always and in all situations).

However, in addition to gender, a person's own characteristics, which actually apply values, are also very important. The presence of women in management teams in the organization's marketing departments is generally associated with strong social commitment (De Castro et al., 2018).

### 3. METHODOLOGY

The paper intends to analyse the leadership styles of the female population in marketing sector and therefore shape and change the culture of the organizations and the marketing strategies.

For this purpose, authors use quantitative research method, utilizing Clark's questionnaire as the main method of data collection. Clark's questionnaire follows the three basic styles of leadership, originally defined by Kurt Lewin as autocratic, democratic (participative) and laissez-faire. The questions and attitudes in the questionnaire were divided into three sets of 10 questions each (using a five-point Likert scale ranging from 1 -almost never to 5- almost always).

The research was conducted in Macedonian companies that have a marketing department or marketing tasks are given to a certain level of management, on a total sample of 115 participants

(65% females and 35% males). The age dissemination suggested that the majority of the employees (57%) are between 25-40 years old, followed by the 40-60 years old (40%) and +60 years old (3%). Regarding the marital status, education and working experience, the dominant majority were married (63%) and hold bachelor degree (64%), with 44% of the respondents having working experience of 6-10 years, followed by people who have work experience between 11-15 years. Furthermore, 19% have more than 15 years of work experience and 13% of the respondents have work experience from 1 up to 5 years.

### 4. RESULTS AND DISCUSSION

The goal of this research is to study the women's dominant leadership style and the differences in terms of leadership styles coming from women's age, education and work experience. It also compares the dominant style of the female leaders with the dominant leadership style practiced by men. The research results show that the participative style (38%) is dominant style among most of leaders, both men and women, in the Macedonian companies. However, because the focus of this paper is on women leadership styles, the authors firstly analyse whether there is difference among the different genders.

Since twenty years ago, the marketing industry as a whole has been expanding quite quickly in the country. The development of information technology and the implementation of new business strategies are primarily to blame for this. But it must be underlined that just 5% of significant companies in the nation's management ranks are held by women. (Symphony Solutions, 2019). This number is within the world average, despite the great struggle for gender equality.

This study provides an evidence that the participative leadership style is represented in both genders. (as shown in Table 1). The Fisher exact test statistic value shows that there are no significant differences in leadership styles between both genders. According to Bass and Avolio (1997), participative management is about developing the ability to influence people, rather than imposing

authority on them, engaging subordinates effectively in the decision making and problem solving process. It is clear that female marketing leaders in the country choose a style that provides them a chance to demonstrate their independence and potential for genuine cooperation with subordinates. The study's findings are also consistent with those of Eagly et al. (2003), who found no conclusive evidence of differences that would distinguish between male and female leaders. Therefore, one of North Macedonia's major challenges to development is the promotion of gender equality. It is particularly important in the economic sphere and the management of enterprises and organizations.

Table 1. Leadership style based on different gender groups

| Results                        |                         |                         |                      |
|--------------------------------|-------------------------|-------------------------|----------------------|
|                                | Male                    | Female                  | Row Totals           |
| Authoritative leadership style | 9<br>(6.61)<br>[0.87]   | 10<br>(12.39)<br>[0.46] | 19                   |
| Participative leadership style | 20<br>(19.13)<br>[0.04] | 35<br>(35.87)<br>[0.02] | 56                   |
| Delegative leadership style    | 11<br>(14.26)<br>[0.75] | 30<br>(26.74)<br>[0.40] | 41                   |
| Column Totals                  | 40                      | 75                      | 115<br>(Grand Total) |

Results in red are Expected Count

Results in light red are Residual

To strengthen the research study, the authors further explore the leadership styles among women in the marketing sector, based on demographic characteristics such as: age, education and working experience.

Table 2. Leadership style based on women's age group

| Results                        |                       |                         |                         |                     |
|--------------------------------|-----------------------|-------------------------|-------------------------|---------------------|
|                                | 25-40                 | 41-60                   | 60+                     | Row Totals          |
| Authoritative leadership style | 2<br>(1.60)<br>[0.10] | 6<br>(5.47)<br>[0.05]   | 2<br>(2.93)<br>[0.30]   | 10                  |
| Participative leadership style | 5<br>(5.60)<br>[0.06] | 20<br>(19.13)<br>[0.04] | 10<br>(10.27)<br>[0.01] | 35                  |
| Delegative leadership style    | 5<br>(4.80)<br>[0.01] | 15<br>(16.40)<br>[0.12] | 10<br>(8.80)<br>[0.16]  | 30                  |
| Column Totals                  | 12                    | 41                      | 22                      | 75<br>(Grand Total) |

Results in red are Expected Count

Results in light red are Residual

The research results, obtained through Fisher’s exact test show that there is no statistical significant difference in practicing leadership style based on women’s different age groups (as shown in Table 2). These findings are consistent with those made by Sessa et al. (2007), who contend that age has no bearing on the decision of leadership style, despite the fact that younger female leaders tend to be more concerned with achieving results quickly, as opposed to older female leaders who have longer-term ambitions.

Table 3. Leadership style based on women’s education

| Results                        |                       |                         |                         |                     |
|--------------------------------|-----------------------|-------------------------|-------------------------|---------------------|
|                                | High School           | Bachelor                | Master                  | Row Totals          |
| Authoritative leadership style | 2<br>(2.13)<br>[0.01] | 4<br>(4.40)<br>[0.04]   | 4<br>(3.47)<br>[0.08]   | 10                  |
| Participative leadership style | 8<br>(7.47)<br>[0.04] | 14<br>(15.40)<br>[0.13] | 13<br>(12.13)<br>[0.05] | 35                  |
| Delegative leadership style    | 6<br>(6.40)<br>[0.03] | 15<br>(13.20)<br>[0.25] | 9<br>(10.40)<br>[0.19]  | 30                  |
| Column Totals                  | 16                    | 33                      | 26                      | 75<br>(Grand Total) |

Results in red are Expected

Count Results in light red are Residual

The next analysis that was carried out was the relationship between the educational level and the leadership style practiced by the women. From the obtained results of the Fisher’s exact test, it was found that  $p = .936$ , which is greater than  $.05$ , thus confirming that there are no significant differences in terms of leadership style based on women’s educational level (as shown in Table 3). It actually means that education does not have any great importance when it comes to the way of leadership among the women leaders included in this research.

Table 4. Leadership style based on women’s working experience

| Results                        |                       |                        |                         |                        |                     |
|--------------------------------|-----------------------|------------------------|-------------------------|------------------------|---------------------|
|                                | 1-5                   | 6-10                   | 11-15                   | 15+                    | Row Totals          |
| Authoritative leadership style | 1<br>(0.80)<br>[0.05] | 2<br>(2.80)<br>[0.23]  | 5<br>(3.60)<br>[0.54]   | 2<br>(2.80)<br>[0.23]  | 10                  |
| Participative leadership style | 2<br>(2.80)<br>[0.23] | 9<br>(9.80)<br>[0.07]  | 12<br>(12.60)<br>[0.03] | 12<br>(9.80)<br>[0.49] | 35                  |
| Delegative leadership style    | 3<br>(2.40)<br>[0.15] | 10<br>(8.40)<br>[0.30] | 10<br>(10.80)<br>[0.06] | 7<br>(8.40)<br>[0.23]  | 30                  |
| Column Totals                  | 8                     | 21                     | 27                      | 21                     | 75<br>(Grand Total) |

Results in red are Expected Count

Results in light red are Residual

The final point raised in this thorough investigation was the leadership style of women in respect to their professional backgrounds. There are no significant differences in terms of leadership style and work experience, according to the Fisher's exact test, which yielded a result of  $p=.855$ , which is greater than  $.05$  (as shown in Table 4). It actually means that education does not have any great importance when it comes to the way of leadership among the women leaders included in this research.. According to the women leaders who participated in this study, education is not a significant factor when it comes to leadership style, which is consistent with Corona (2010)'s finding that there is no correlation between years of professional experience and leadership style.

According to the participative style, female leaders know how to use their creativity to solve organizational problems. This is mostly due to the focus on teamwork and communication. In addition to teamwork for a modern organization, this style is characterized by the involvement of employees in decision-making, information exchange, trust, consensus and cooperation. It also encourages self-confidence and enthusiasm among employees, which are of great importance in marketing leadership.

## **CONCLUSION**

Women in marketing leadership have not been extensively researched. There are many scientific studies on women in leadership in general, but there are fewer on women in marketing leadership. Despite the progress women are facing in the marketing sector, as of November, 2018, worldwide, only 27.1% of women were managers and leaders (ILO, 2019). However, it cannot be denied that that industry is undergoing a wave of transformation. This is a result of the rapid rise in the number of women working in the marketing business, their independence from traditional family roles and the shadow of men, and the fact that the nature of the marketing industry allows

women to both succeed at work and contribute to their families.

The study provides an evidence that women leaders dominantly use a participative leadership style, which also means that besides the involvement of the employee in the decision-making process, they show respect, care and empathy for others; act with trust and strive to fulfill the goals of the organization. Since there is no differences in leadership styles among the genders, the paper supports the feminist idea of women being equal to men; thus breaking the business and leadership stereotypes in regards to the women being less valuable in the business environment. Hence, they deserve equal opportunity for organizational leadership position within the marketing world. Moreover, the female leadership should be no longer considered as a new form of leadership, but a way to successfully manage organizations.

## **RESEARCH LIMITATIONS**

Study's limitations are expected. The possibility of social desirability bias is one of the key drawbacks. The amount of honesty should not be assumed even though the respondents are anonymous. Uncertainty over the respondents' representation of the industry's overall population is another danger. The respondents' demographic location is the final drawback. Since only the Republic of North Macedonia was examined in this study, more comprehensive analyses of these variables should be provided by subsequent research.

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