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Open Science

Open Science Philosophy

Open science encompasses unrestricted access to scientific research articles, access to data from public research, and collaborative research enabled by information and communication technology tools, models, and incentives. Broadening access to scientific research publications and data is at the heart of open science. The objective of open science is to make research outputs and its potential benefits available to the entire world and in the hands of as many as possible:

- Open science promotes a more accurate verification of scientific research results. Scientific inquiry and discovery can be sped up by combining the tools of science and information technologies. Open science will benefit society and researchers by providing faster, easier, and more efficient availability of research outputs.
- Open science reduces duplication in collecting, creating, transferring, and re-using scientific material.
- Open science increases productivity in an era of tight budgets.
- Open science results in great innovation potential and increased consumer choice from public research.
- Open science promotes public trust in science. Greater citizen engagement leads to active participation in scientific experiments and data collection.

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Open Society

An open society allows individuals to change their roles and to benefit from corresponding changes in status. Open science depends to a greater or lesser extent on digital technologies and innovations in structural processes by an open society. When realized, open science research and innovation can create investment opportunities for new and better products and services and therefore increase competitiveness and employment. Open science research and innovation is a key component of thematic open science priorities. Central to the open science digital infrastructure is enabling industry to benefit from digital technology and to underpin scientific advances through the development of an open society. Open science research and innovation can also contribute to society as a global actor because scientific relations can flourish even where global relations are strained. Open science has a critical role across many areas of decision making in providing evidence that helps understand the risks and benefits of different open science choices. Digital technology is making the conduct of open science and innovation more collaborative, more global, and more open to global citizens. Open society must embrace these changes and reinforce its position as the leading power for science, for new ideas, and for investing sustainably in the future.

It is apparent in open society that the way science works is fundamentally changing, and an equally significant transformation is taking place in how organizations and societies innovate. The advent of digital technology is making research and innovation more open, collaborative, and global. These exchanges are leading open society to develop open science and to set goals for research and innovation priority. Open science goals are materializing in the development of scientific research and innovation platforms and greater acceptance of scientific data generated by open science research. Open science research and innovation do not need help from open society to come up with great ideas, but the level of success ideas ultimately reach is undoubtedly influenced by regulation, financing, public support, and market access. Open society is playing a crucial role in improving all these success factors.

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Open science represents a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and collaborative tools. These innovations capture a systemic change to the way science and research have been carried out for the last fifty years. Science is shifting from the standard practice of publishing research results in scientific publications after the research and reviews are completed. The shift is towards sharing and using all available knowledge at an earlier stage in the research process. Open science is to science what digital technology is to social and economic transactions: allowing end users to be producers of ideas, relations, and services and in doing so, enabling new working models, new social relationships and leading to a new modus operandi for science. Open science is as important and disruptive as e-commerce has been for the retail industry. Just like e-commerce, the open science research paradigm shift affects the whole business cycle of doing science and research. From the selection of research subjects to the carrying out of research, to its use and re-use, to the role of universities, and that of publishers are all dramatically changed. Just as the internet and globalization have profoundly changed the way we do business, interact socially, consume culture, and buy goods, these changes are now profoundly impacting how one does research and science.

The discussion on broadening the footprint of science and on novel ways to produce and spread knowledge gradually evolved from two global trends: Open Access and Open Source. The former refers to online, peer-reviewed scholarly outputs, which are free to read, with limited or no copyright and licensing restrictions, while open source refers to software created without any proprietary restriction and which can be accessed and freely used. Although open access became primarily associated with a particular publishing

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or scientific dissemination practice, open access already sought to induce a broader practice that includes the general re-use of all kinds of research products, not just publications or data. It is only more recently that open science has coalesced into the concept of a transformed scientific practice, shifting the focus of researchers' activity from publishing as fast as possible to sharing knowledge as early as possible. Open science is defined as the idea that scientific knowledge of all kinds should be openly shared as early as is practical in the discovery process. As a result, the way science is done in the future will look significantly different from the way it is done now. Open science is the ongoing evolution in the modus operandi of doing research and organizing science. This evolution is enabled by digital technology and is driven by both the globalization of the scientific community and increasing public demand to address the societal challenges of our times. Open science entails the ongoing transitions in the way research is performed, researchers collaborate, knowledge is shared, and science is organized.

Open science impacts the entire research cycle, from the inception of research to its publication, and on how this cycle is organized. The outer circle reflects the new interconnected nature of open science, while the inner circle shows the entire scientific process, from the conceptualization of research ideas to publishing. Each step in the scientific process is linked to ongoing changes brought about by open science, including the emergence of alternative systems to establish a scientific reputation; changes in the way quality and impact of research are evaluated; the growing use of scientific blogs; open annotation; and open access to data and publications. All institutions involved in science are affected, including research organizations, research councils, and funding bodies. The trends are irreversible, and they have already grown well beyond individual projects. These changes predominantly result from a bottom-up process driven by a growing number of researchers who increasingly employ social media in their research and initiate globally coordinated research projects while sharing results at an early stage in the research process.

Open science is encompassed in five schools of thought:

- the infrastructure school, concerned with technological architecture
- the public school, concerned with the accessibility of knowledge creation
- the measurement school, concerned with alternative impact assessment
- the democratic school, concerned with access to knowledge
- the pragmatic school, concerned with collaborative research

According to the measurement school, the reputation and evaluation of individual researchers are still mainly based on citation-based metrics. The h-index is an author-level metric that attempts to measure both the productivity and citation impact of the publications of a scientist or scholar. The impact factor is a measure reflecting the average number of citations to articles published in an academic journal and is used as a proxy for the relative importance of a journal.

Numerous criticisms have been made of citation-based metrics, primarily when used, and often misused, to assess the performance of individual researchers. These metrics:

- are often not applicable at the individual level
- do not take into account the broader social and economic function of scientific research
- are not adapted to the increased scale of research
- cannot recognize new types of work that researchers are performing

Web-based metrics for measuring research output, popularized as altmetrics, have recently received much attention: some measure the impact at the article level, others make it possible to assess the many outcomes of research in addition to the number of scientific articles and references. The current reputation and evaluation system has to adapt to the new dynamics of open science and acknowledge and incentivize

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engagement in open science. Researchers engaging in open science have growing expectations that their work, including intermediate products such as research data, will be better rewarded or taken into account in their career development. Vice-versa, the use, and reuse of open data will require appropriate codes of conduct requiring, for example, the proper acknowledgment of the original creator of the data.

These ongoing changes are progressively transforming scientific practices with innovative tools to facilitate communication, collaboration, and data analysis. Researchers that increasingly work together to create knowledge can employ online tools and create a shared space where creative conversation and collaboration can occur. As a result, the problem-solving process can be faster, and the range of problems that can be solved can be expanded. The ecosystem underpinning open science is evolving very rapidly. Social network platforms for researchers already attract millions of users and are being used to begin and validate more research projects.

Furthermore, the trends towards open access are redefining the framework conditions for science and thus have an impact on how open innovation is produced by encouraging a more dynamic circulation of knowledge. It can enable more science-based startups to emerge thanks to the exploitation of openly accessible research results. Open science, however, does not mean free science. It is essential to ensure that intellectual property is protected before making knowledge publicly available in order to subsequently attract investments that can help translate research results into innovation. If this is taken into account, fuller and broader access to scientific publications and research data can help to accelerate innovation. Investments that boost research and innovation in open science would benefit society with fewer barriers to knowledge transfer, open access to scientific research, and greater mobility of researchers. In this context, open access can help overcome the barriers that innovative organizations face in accessing the results of research funded by the public.

Open innovation

An open society is the largest producer of knowledge, but the phenomenon of open science is changing every aspect of the scientific method by becoming more open, inclusive, and interdisciplinary. Ensuring open society is at the forefront of open science means promoting open access to scientific data and publications alongside the highest standards of research integrity. There are few forces in this globe as engaging and unifying as science. The universal language of science maintains open channels of communication globally. Open society can maximize its gains through maintaining its presence at the highest level of scientific endeavor, and by promoting a competitive edge in the knowledge society of the information age. The ideas and initiatives described in this publication can stimulate anyone interested in open science research and innovation. It is designed to encourage debate and lead to new ideas on what and open society should do, should not do, or do differently.

An open society can lead to a research powerhouse; however, open society rarely succeeds in turning research into innovation and in getting research results to the global market. Open society must improve at making the most of its innovation talent, and that is where open innovation comes into play. The basic premise of open innovation is to open up the innovation process to all active players so that knowledge can circulate more freely and be transformed into products and services that create new markets while fostering a stronger culture of entrepreneurship. Open innovation is defined as the use of purposive inflows and outflows of knowledge to accelerate internal innovation. This original notion of open innovation was primarily based on transferring knowledge, expertise, and even resources from one company or research institution to another. This notion assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they seek to improve their performance. The concept of open innovation is continually evolving and is moving from linear, bilateral transactions and collaborations

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towards dynamic, networked, multi-collaborative innovation ecosystems. This means that a specific innovation can no longer be seen as the result of predefined and isolated innovation activities but rather as the outcome of a complex co-creation process involving knowledge flows across the entire economic and social environment. This co-creation takes place in different parts of the innovation ecosystem and requires knowledge exchange and absorptive capacities from all the actors involved, whether businesses, academia, financial institutions, public authorities, or citizens.

Open innovation is a broad term, which encompasses several different nuances and approaches. Two main elements underpin the most recent conceptions of open innovation: the users are in the spotlight and invention becomes an innovation only if users become a part of the value creation process. Notions such as user innovation emphasize the role of citizens and users in the innovation processes as distributed sources of knowledge. This kind of public engagement is one of the aims of open science research and innovation. The term 'open' in these contexts has also been used as a synonym for 'user-centric'; creating a well-functioning ecosystem that allows co-creation and becomes essential for open innovation. In this ecosystem, relevant stakeholders are collaborating along and across industry and sector-specific value chains to co-create solutions for socio-economic and business challenges. One important element to keep in mind when discussing open innovation is that it cannot be defined in absolutely precise terms. It may be better to think of it as a point on a continuum where there is a range of context-dependent innovation activities at different stages, from research to development through to commercialization, and where some activities are more open than others. Open innovation is gaining momentum thanks to new large-scale trends such as digitalization and the mass participation and collaboration in innovation that it enables. The speed and scale of digitalization are accelerating and transforming the way one designs, develops, and manufactures products, the way one delivers services, and the products and services themselves. It is enabling innovative processes and new ways of doing business, introducing new cross-sector value chains and infrastructures.

Open society must ensure that it capitalizes on the benefits that these developments promise for citizens in terms of tackling societal challenges and boosting business and industry. Drawing on these trends, and with the aim of helping build an open innovation ecosystem in open society, the open society's concept of open innovation is characterized by:

- combining the power of ideas and knowledge from different actors to co-create new products and find solutions to societal needs
- creating shared economic and social value, including a citizen and user-centric approach
- capitalizing on the implications of trends such as digitalization, mass participation, and collaboration

In order to encourage the transition from linear knowledge transfer towards more dynamic knowledge circulation, experts agree that it is essential to create and support an open innovation ecosystem that facilitates the translation of knowledge into socio-economic value. In addition to the formal supply-side elements such as research skills, excellent science, funding and intellectual property management, there is also a need to concentrate on the demand side aspects of knowledge circulation, making sure that scientific work corresponds to the needs of the users and that knowledge is findable, accessible, interpretable and reusable. Open access to research results aims to make science more reliable, efficient, and responsive and is the springboard for increased innovation opportunities, e.g. by enabling more science-based startups to emerge. Prioritizing open science does not, however, automatically ensure that research results and scientific knowledge are commercialized or transformed into socio-economic value. In order for this to happen, open innovation must help to connect and exploit the results of open science and facilitate the faster translation of discoveries into societal use and economic value.

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Collaborations with global partners represent important sources of knowledge circulation. The globalization of research and innovation is not a new phenomenon, but it has intensified in the last decade, particularly in terms of collaborative research, international technology production, and worldwide mobility of researchers and innovative entrepreneurs. Global collaboration plays a significant role both in improving the competitiveness of open innovation ecosystems and in fostering new knowledge production worldwide. It ensures access to a broader set of competencies, resources, and skills wherever they are located, and it yields positive impacts in terms of scientific quality and research results. Collaboration enables global standard-setting, allows global challenges to be tackled more effectively, and facilitates participation in global value chains and new and emerging markets.

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The scholarly research review is a multidimensional evaluation procedure in which standard peer review models can be adapted in line with the ethos of scientific research, including accessible identities between reviewer and author, publishing review reports and enabling greater participation in the peer review process. Scholarly research review methods are employed to maintain standards of quality, improve performance, provide credibility, and determine suitability for publication. *Responsible Peer Review Procedure:* Responsible peer review ensures that scholarly research meets accepted disciplinary standards and ensures the dissemination of only relevant findings, free from bias, unwarranted claims, and unacceptable interpretations. Principles of responsible peer review:

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All submitted manuscripts are subject to the scholarly research review process, in which there are three stages of evaluation for consideration: pre-review manuscripts, chair-review presentation, and final-review manuscripts. All submitted full text papers, that may still be withstand the editorial review process, are presented in the conference proceedings. Manuscripts are tracked and all actions are logged by internal and external reviewers according to publication policy. External reviewers' editorial analysis consists of the evaluation reports of the conference session chairs and participants in addition to online internal and external reviewers' reports. Based on completion of the scholarly research review process, those manuscripts meeting the publication standards are published 10 days after the event date.

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Effects of the CPTED Study on Female University Students in Bus Stations

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Abstract

A study on the effects of crime prevention through environmental design (CPTED) on female university students is conducted in the former Zarqa complex. This study's primary goal is to learn in-depth information about creating a safe public transportation environment. The research findings aim to simulate safety in the old Zarqa bus station and provide a comprehensive view of the factors contributing to increasing crime rates. As should be clear, girls are the group in the complex most at risk of harm and crime. This can be attributed to several factors, such as *surveillance*, *poor lighting*, and a lack of *natural surveillance* in the complex. Particular research findings account for numerous entrances and exits, which may make it challenging to restrict criminals' movement inside the Bus Station and increase its vulnerability. In addition, maintenance and a general lack of interest in the location serve as an open invitation for criminal activity at the bus station because it gets no care or upkeep. Finally, the study's conclusion discusses additional potential ways to address the issues raised in the Bus Station Area and lessen the likelihood of occurring in society. Additionally, it offered suggestions for further studies.

Keywords: CPTED, Social disorganization theory, Surveillance, Maintenance, Access control, Bus station, Safety, Spatial mapping, Defendable space, Broken windows, Routine activities, Geographical juxtaposition, and Crime pattern theory.

Introduction

Two of the most crucial aspects to take into account when assessing the caliber of public transportation are safety and security (Cozens, 2015). Bus stations are where a variety of crimes occur. The underlying cause of these problems and crimes is the absence or improper application of Crime Prevention Through Environmental Design (CPTED) principles and practices. Activation, Surveillance, Ownership, Stakeholder management, Legibility, Territoriality, and Vulnerability are the specific principles (Miles et al., 2021). CPTED has been used increasingly to reduce crime on public transportation, particularly in and around railroad stations Cozens (2015). Unfortunately, in addition to obstructing and preventing the legal activities for which these stations are intended, public transit stations frequently turn into places for crime and disorder. The difficulty is in reducing these problems (Felson, 1996).

Bus complexes tend to have much more dangerous and concentrated crime than other types, even though numerous studies have covered the issue. More research is required to understand the topic and its effects on college students. The question of the extent and depth of crime in the areas that students are required to use is raised in Zarqa, where 1,796 crimes were committed there in 2021, accounting for 8.56 percent of all crimes in Jordan, as a result of the psychological pressure in

these areas (Criminal Information Department, 2021). This is particularly true considering Zarqa's reputation as a place for criminals and those with a criminal past.

There are only two bus complexes in Zarqa, as shown in Figure (1), which are considered by many to be a focal point of crime in the area. Most of the population heavily relies on public transportation (Attour, 2009). This is not surprising because public transit stations frequently serve as havens for crime and disorder (Felson, 1996). The investigation and analysis of this matter are of the utmost importance given the significance and vitality of the region known as Zarqa.

This study examines the safety and security of the built environment for university students using bus stops. The focus of this study will be the old Zarqa complex, with a discussion of the problems and services offered to students on the bus or at the station. The 2013 murder of a university student inside this bus complex seems ingrained in Jordanian society. How do those events affect students and their well-being, and how much does the crime in that station impact education? Check to see if the CPTED was used to protect students.

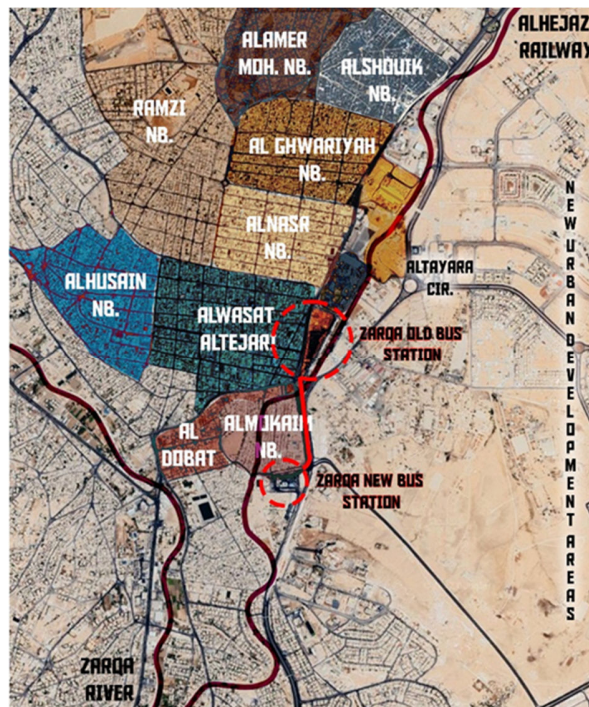


Figure 1: Zoning for the Surroundings of Zarqa Old Bus Station. Source: <https://www.google.com/maps/place/Zarqa+Old+bus+station./@32.0629752,36.092937,672m/data=!3m2!1e3!4b1!4m5!3m4!1s0x151b6f8930c45987:0xd8e8bc836a63c5db!8m2!3d32.0629707!4d36.0951257?hl=en> + Authors Analysis, 2022.

Research Questions

- R.Q.1. What constitutes CPTED's core components in bus stations?
- R.Q.2. What do the CPTED components impact crime in Zarqa Old Bus Station?
 - Sub. R.Q.2. Does the CPTED offer safety to female Zarqa Old Bus Station users?
- R.Q.3. What main elements influence Zarqa Old Bus Station's built environment quality?

- R.Q.4. What should be done to promote CPTED in Zarqa Old Bus Station, prevent crime, and enhance women's experience?

Research Goal

This research seeks to contribute to transforming public transportation into a safe environment for college students, especially women.

Research Objectives

- To determine the requirements for developing a secure built environment in bus stations.
- To determine whether the bus stations are a secure environment, particularly for women.
- To make suggestions for making the Old Bus Stations a secure area.

Research Significances

This study seeks to solve an issue that lowers students' quality of life, offering assistance with the problem and suggesting fixes.

Literature Review

Place-based Crime Prevention

Spatial mapping has been a foundation for the Social Disorganization Theory since the first half of the 20th century (Shaw and McKay 1942). It also serves as the basis for theories about place-based crime and crime prevention, developed because the crime was concentrated in specific areas and remained relatively stable despite ongoing population and demographic changes (Piroozfar, 2018). Several theories are discussed in contemporary crime theories that link crime to the built environment. The theories of defendable space, broken windows, routine activities, geographical juxtaposition, and crime pattern theory are all used in this study. These comprise the primary guiding theory that served as the foundation for this study.

According to urban theorists and researchers, city planners and urban designers should create a systematic feedback loop to transfer the learning experience of the public space from the post-occupancy and operational stages into the planning and design stages to increase the public space's inclusiveness, which improves the public space's safety and way of life. For example, Jacobs' criticism of new urban architecture and Wood's security recommendations for the Chicago Housing Authority in 1961 both suggested that "[modern] cities were custom-made for crime" (Jacobs, 1961). Her "eyes on the street" defense emerged, as a result, reinforcing the necessity of natural surveillance and territoriality. Place-based crime prevention is a method that focuses on the relationship between a place's physical attributes and the likelihood of crime, frequently

without considering the population or demographic makeup of the area's users or residents. It is a multidisciplinary approach to lowering crime and raising feelings of safety. It focuses on the built environment, including site usage and potential changes that could be made to deter crime.

Theories of Crime Prevention through Environmental Design (CPTED)

To highlight the possibility that the physical environment may provide opportunities for crime to occur, C. Ray Jeffery coined the term "CPTED" in the 1970s. As a result, changing the environment can be used to reduce crime. Changing the built environment to make "regular" users feel at ease while making "irregular" users feel uneasy and afraid of engaging in improper anti-social behavior is the aim of CPTED. According to Jeffery (1971), sociologists have over-explained the social causes of crime, such as subcultural influences and relative deprivation. Therefore, more attention must be paid to minimizing environmental opportunities for crime (Cornish and Clarke, 1986). Jeffery (1971), a proponent of CPTED, acknowledges the significance of psychological, biological, and environmental factors in crime (see also Parnaby 2006) (Piroozfar, 2018)).

Social Disorganization Theory

The Social disorganization theory it's One of the most fundamental sociological approaches to the study of crime and delinquency emanates from the Chicago school (Sampson & Groves, 2017) related to ecological theories and was founded to describe community social organization, which, in turn, accounted for variations in crime and delinquency, At the root of social disorganization theory is the explanation of variations in criminal offending and delinquency, across both time and space, as a product of institutional disintegration. As Bursik (1984) and others (see, e.g., Morris 1970; Short 1969) have argued, few works in criminology have had more fluency than Juvenile Delinquency and Urban Areas (1942, 1969). However, Shaw and McKay view social disorganization as a situationally rooted variable, not an inevitable property of all urban neighborhoods.

The Social disorganization theory in CPTED has become a vital issue in understanding the prevalence of high crime rates (such as poverty) in neighborhood crime. Still, the authors argue for the need to look more carefully at how local networks and forms of formal and informal organizations may lower neighborhood crime rates and how social ties and social controls often interact (Henry and Lukas, 2017) and examine the relationship between neighborhood social networks and crime sometimes reveals a positive relationship (Clinard and Abbott, 1976; Greenberg, Rohe, and Williams, 1982; Maccoby, Johnson, and Church, 1958; Merry, 1981; Rountree and Warner, 1999). However, the systemic approach is drawn into question by research documenting higher crime in neighborhoods with relatively dense networks and strong attachments (Bursik and Grasmick, 1993; Horowitz, 1983; Suttles, 1968; Whyte, 1937) found that informal control is associated with reduced crime, but that crime also reduces informal power because it increases perceptions of crime risk (Bellair, 2017).

Defensible Space Theory

The Rational Offender Theory shifted the attention away from the offender's ideas and behavior and onto the actual environment, the offender's decision trees, and how the contextual elements

impact it, termed "cues." It served as the foundation for Oscar Newman's Defensible Space Theory, founded on seven fundamental notions in the early 1970s.

It promotes design to improve territoriality and create a sense of ownership by clearly distinguishing between private and public locations via symbolic boundaries (Figure 2). It was further developed into what was billed as "the second generation CPTED," with Saville and Cleveland (1997) drawing attention to some urban design (and planning) features with an emphasis on crime prevention, such as human scale development, urban meeting places, youth clubs, residents' participation, and residents' responsibility.

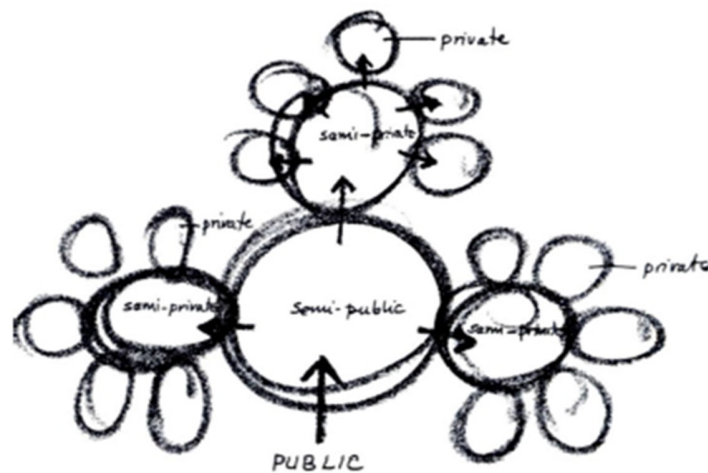


Figure 2: Discreet defensible spaces allocated to various residents. Source: (Newman 1996).

Broken Windows Theory

Kelling and Wilson's 'Broken Windows Theory' (1982) suggests that the physical environment plays a crucial role in the rate of criminal activity and fear of crime. Suggesting that law enforcement only focused on the serious crime, Kelling and Wilson believed that serious crimes occurred due to a series of minor crimes that led to a severe final crime (Cozens, Wortley, & Mazerolle., 2008). Their theory was that crime emulated from disorder, and if confusion were eliminated, serious crime would not occur. A criticism against the theory has been the link between 'undesirables' such as the homeless and crime. However, this link has been shown by other researchers to be often nonexistent (Harcourt, 2001). The theory has also been criticized for being only a short-term partial solution (Taylor, 2001), criminalization of communities of color (Roberts, 1999), implicit bias against racial or cultural minorities (Sampson & Raudenbush, 2004), building up on the premise that social disorder and crime are assumed to have a causal-effect relation, failing to take into account the third factor, i.e., collective efficacy (Sampson & Raudenbush, 2004) and more broadly for not being theoretically robust enough (Thacher, 2004).

Routine Activities Theory

Evidence in the RAT case reveals that crime heavily relies on the typical behaviors of offenders, victims, and guardians. These everyday activities predominantly occur and have their reasons for existence at a distance from the crime place, i.e., the crime results from the spatially based juxtaposition of criminals', victims', and guardians' usual activities. Therefore, in estimating crime risks in a given region, the proximity of high-crime neighborhoods and the density of local criminals will be essential.

Geographical Juxtaposition Theory

Morgan and Homel (2013) mention two more systems besides the criminal justice system. Methods to crime prevention, social (human) and environmental issues (physical). The socioeconomic situation, the technique focuses on the social and economic causes of crime and reducing the supply of criminal offenders. The environmental approach alters the physical environment to limit possibilities for corruption, as well as CPTED and situational crime prevention. Ekblom's (1997) Criminal Conjunction Opportunities (CCO) assists in conceptualizing offender and situational perspectives and emphasizes the significance of "distant" and "immediate" criminal antecedents. We can track down situational criminality SCP (Clarke 1997) refers to the variables that act AT the scene of the crime by comparison GJ, by definition, comprises aspects that originate OUTSIDE the local environment of the crime location.

Crime Pattern Theory

Paths and edges are also mentioned in Crime Pattern Theory (CPT). Even though there has been substantially less study on these factors, criminological studies have supported and continue to support the idea. For example, in terms of edge research, Brantingham and Brantingham's (1975) survey reveals that crime predominates in the outskirts of neighborhoods. We need to be more explicit about the complexities of the link between land use and crime. However, in their evaluation of the data, Anderson et al. (2013, p. 727) indicate that research on land use and c needs to be more empirical and that "there is a limited knowledge of the particular micro-level features of these interactions." It is claimed that CPTED audits performed at this level of analysis might give helpful information in this respect. The data on land use and crime hazards has been concentrated on existing metropolitan areas. Yet, significantly, new projects and land use in an existing region can influence and be affected by crime (see Figure 3).

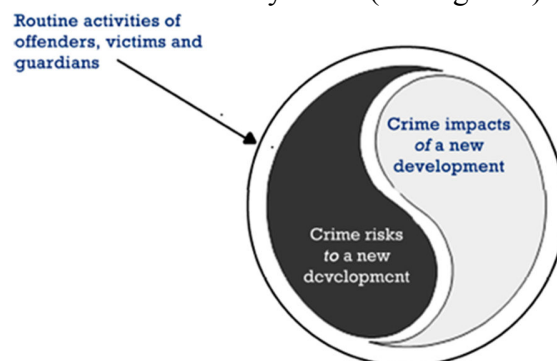


Figure 3: Risks to and Crime Impacts of New Developments (Adapted from (Cozens 2011))

Research Design and Methodology

The research employs the case study design methodology to obtain a case study layout and focuses on precise and exciting possibilities. This could be an attempt to test a theory against a prevalent problem or a topic chosen to gauge how people view various aspects of environmental design and how they affect crime and crime prevention. Investigations into CPTED and crime-prevention techniques have occurred at Zarqa Old Bus Station.

Case study research is employed to advance reader and researcher knowledge of a particular group, organization, or social setting (Yin 2014). The embedded single-unit case study (Yin 2014), the case study design selected for this study, calls for gathering various databases, information, and facts and a cross-analysis of the relationships among them. The data collection process for evaluating Zarqa Old Bus Station case study will involve the Collect of Data through the Questionnaire method, which has been thoroughly described below. This is regarded as the most appropriate strategy given that the research aims to gain understanding and insight into people's perceptions of the environment of Zarqa Old Bus Station, particularly those of female university students. Therefore, the research methods listed below were used to gather information for the study.

Collect Data through a Questionnaire

A questionnaire was chosen as the research method to enable the researchers to collect data from many respondents. The analytical questionnaire was the type of survey used for this study because it would allow the researcher to examine the various females, their ages, their experiences, and how those things might affect how they perceive crime and the renovations to Zarqa Old Bus Station. Both closed and open-ended questions were used in the questionnaire. Open-ended questions were used toward the end of the questionnaire to encourage participants to express their opinions and suggestions after learning about the research from earlier closed questions.

The researchers created the questionnaire's questions, which a qualified group of CPTED questionnaire editors then reviewed. The demographic questionnaire included questions about the participant's frequency of use of Zarqa Old Bus Station, the university's name, and the academic year. Participants were also asked about their emotions, perceptions, and whether they had any previous unpleasant experiences there. These inquiries were made to ascertain the variations in opinions and reactions to the area, the crimes that have occurred there, and the primary causes of crime. The following set of inquiries centered on the CPTED components—surveillance, upkeep and management, natural access control and legibility, as well as individual and collective ownership—that the researchers had selected to investigate in this study. The questionnaire asked participants to rate the quality of various techniques used in the bus station.

The categorical data were expressed in frequency and percentages; Multiple linear regression was used to predict crime in Zarqa old Bus station as a function of CPTED's core components, alpha level set at <0.05 deemed statistically significant, and SPSS ver 28 was used to analyze the data.

Zarqa Old Bus Station

In this study, the crime prevention strategy used in the case study of Zarqa Old Bus Station is evaluated in terms of its effectiveness. The area (Figures 4-6) is known as Abu Tafesh Circle, also known as Army Circle, and is regarded as the entrance to Zarqa City and southwest of Zarqa. The Old Bus Station, depicted on the map, is famous for its street markets, various shops, and a wealth of public transportation options (2). The Old Bus Station is the city's primary economic and transportation gateway. It is a busy tourist destination with various transportation options and retail establishments. According to The Directorate of General Security, it is regarded as one of Zarqa's high-crime hotspots because of its numerous problems with antisocial behavior, drugs, and violence unity.

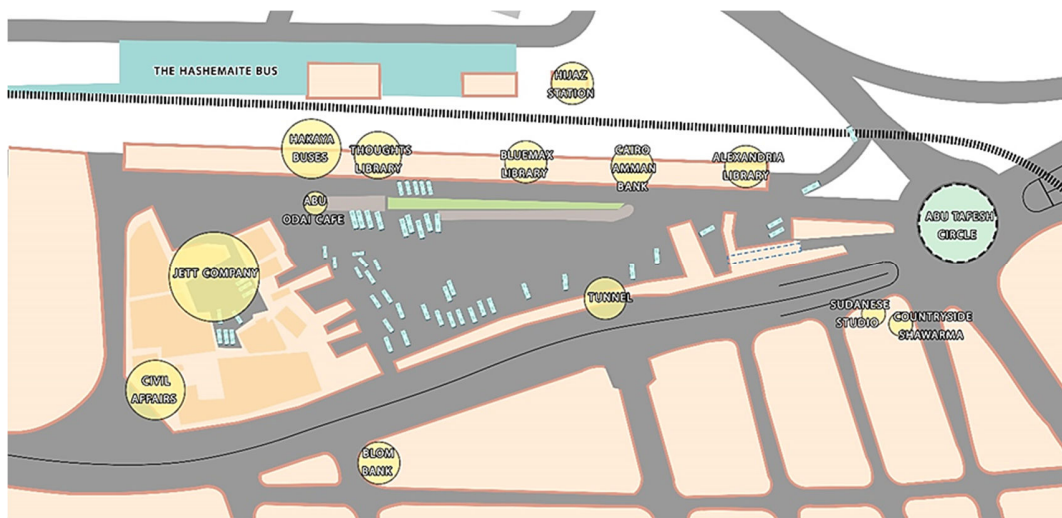


Figure 4: Zoning for Zarqa Old Bus Station. Source: The Authors, 2022.

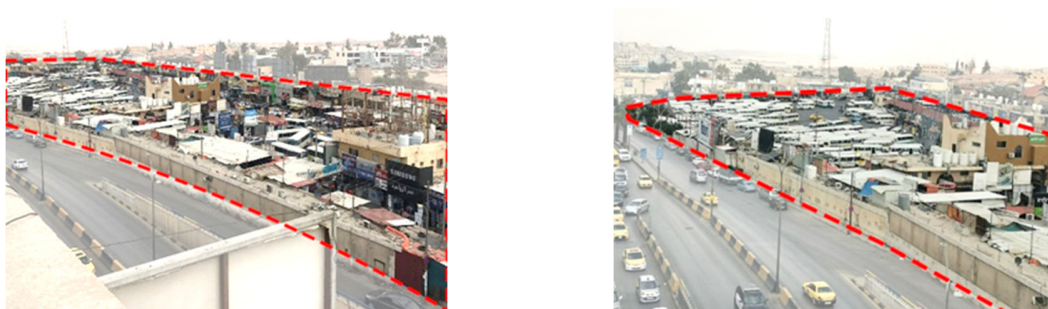


Figure 5-6: Zarqa Old Bus Station Zone. Source: The authors, 2022.

Data Collection and Analysis

Using a worksheet with questions regarding the conditions of Zarqa old bus station, one of five perception scores (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) were given to each of the questions.

Study socio-demographic variables

As shown in Table (1), a total of 168 female participants were enrolled in the study; 64.3% were students at Hashemite University, with 24.5% above the fourth academic year, and about three-quarters of the sample used Zarqa old Bus station during the day and the night period.

Variables	Categories	Frequency	Percentage
Year of education	First-year	34	20.0
	Second year	31	18.5
	Third year	29	17.3
	Fourth year	33	19.7
	More	41	24.5
University	Hashemite university	107	64.3
	Al-Zarqa'a university	11	6.5
	Al-AlBayt university	18	10.7
	Jordan university of science and technology	5	3.0
	Jordan university	6	3.6
	Al-Yarmouk university	6	3.6
	Al-Balqa'a university	5	3.0
	Other	9	5.4
Time to use the bus	Day	38	22.6
	Night	7	4.2
	Day and night	123	73.2

Table 1: Study of socio-demographic variables. Source: The authors, 2022.

What effects on crime do the CPTED elements have in Zarqa Old Bus Station?

Table (2) shows that the regression model was statistically significant, with $F(6,160) = 8.751$ and a p-value of 0.001, indicating that at least one predictor has a considerable effect. Additionally, about 31.0 percent of the crime variation in Zarqa's old bus station can be attributed to the sum of the six predictors. In the same setting, it was discovered that Zarqa bus station lighting was negatively correlated with the incidence of crime. As participants' perception of Zarqa'a bus station lighting increases by one unit, crime perception is expected to decrease by $B = -1.046$, $p = 0.001$ unit on average. Zarqa bus station, frequently used, has also been linked negatively to a perceived reduction in crime ($B = -0.715$, $p = 0.001$) unit.

Additionally, numerous entrances and exits at Zarqa Bus Station are positively associated with increasing crime perception by ($B = 1.677$, $p = 0.008$) unit. On the other hand, believing that the entrances and exits of Zarqa Bus Station are constantly watched is negatively associated with reducing crime perception by ($B = -0.823$, $p = 0.005$) unit- see Table (2). Last but not least, it was discovered that having security, police, or surveillance cameras present was negatively associated with reducing crime perception by ($B = -0.715$, $p = 0.002$) and ($B = -0.619$, $p = 0.007$) units, respectively.

Predictors	B	Std error	T-value	p-value
Do I feel that the lighting is good at Zarqa Bus Station during the day and night	-1.046	0.286	-3.662	0.001
Do I feel like Zarqa Bus Station is always populated so that I can get to someone when needed	-0.715	0.221	-3.229	0.001
Do I feel that Zarqa Bus Station has many entrances and exits	1.677	0.629	2.666	0.008
Do I feel that the entrances and exits of Zarqa Bus Station are permanently monitored	-0.823	0.294	-2.798	0.005
Do I feel that Zarqa Bus Station's facilities are being taken care of permanently	-0.715	0.224	-3.193	0.002
Do I feel that there are security, police, or surveillance cameras at Zarqa Bus Station	-0.619	0.230	-2.692	0.007
$F(6,160) = 8.751, p < 0.001, Adj R^2 31.2\%$				

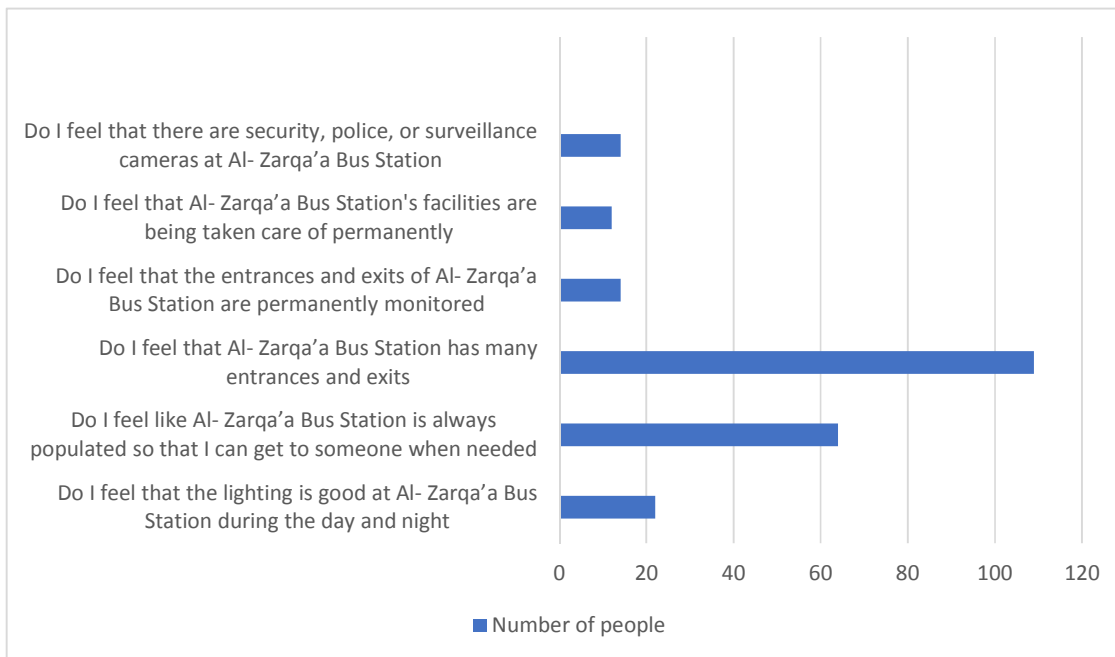
Table 2: Multiple linear regression to predict crime in Zarqa old Bus station. Source: The authors, 2022.

What primary factors affect the built environment quality at Zarqa Old Bus Station?

Three main factors were examined to determine their effects on deterring crime in Zarqa Old Bus Station. The findings are shown in Table (3) and Figure (7). For example, about 70% of participants disagreed that the bus station has good lighting during the day and night, while 38.1 % agreed that it is always populated. In the same context, 64.9 percent of respondents agreed that the bus station has numerous entrances and exits, as shown in Figures (8-10), increasing the crime risk. Still, most respondents (68.4 percent, 85.8 percent, and 72.6 percent, respectively) did not believe that the bus station was continuously watched over or cared for.

Variables	Strongly disagree/disagree n (%)	Neutral n (%)	Strongly agree/agree n (%)
Do I feel that the lighting is good at Zarqa Bus Station during the day and night	119(70.8)	27(16.1)	22(13.1%)
Do I feel like Zarqa Bus Station is always populated so that I can get to someone when needed	47(28.0)	57(33.9)	64(38.1)
Do I feel that Zarqa Bus Station has many entrances and exits	26(15.5)	33(19.6)	109(64.9)
Do I feel that the entrances and exits of Zarqa Bus Station are permanently monitored	115(68.4)	39(23.2)	14(8.4)
Do I feel that Zarqa Bus Station's facilities are being taken care of permanently	144(85.8)	12(7.1)	12(7.1)
Do I feel that there are security, police, or surveillance cameras at Zarqa Bus Station	122(72.6)	32(19.0)	14(8.4)

Table 3: Descriptive statistics for main elements influencing Zarqa CPTED Old Bus Station. Source: The authors, 2022.



Figurer 7: Chart for main elements influencing Zarqa CPTED Old Bus Station



Figure 8: Entrances and Exits of Zarqa Old Bus Station. Source: The authors, 2022.

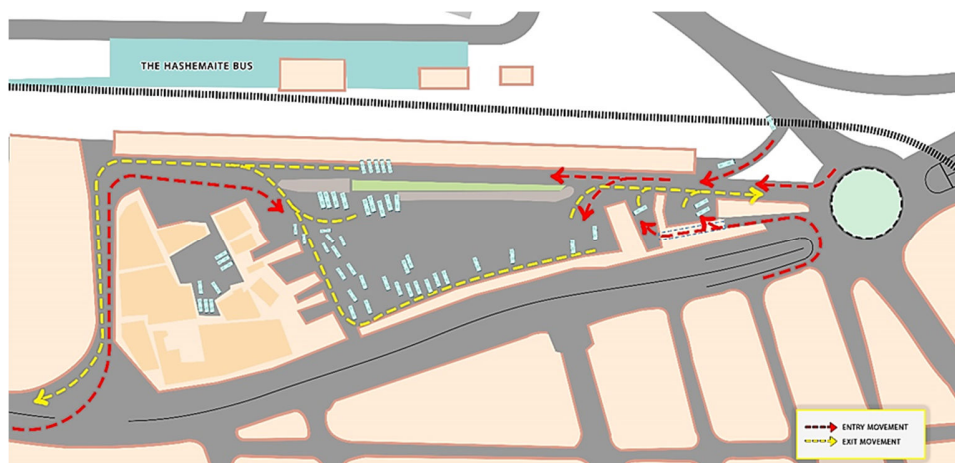


Figure 9: Movements from Entrances and Exits of Zarqa Old Bus Station. Source: The authors, 2022.



Figure 10: Problems mentioned in the Questionnaire. Source: The Authors, 2022.

Findings

The lack of or improper use of Crime Prevention Through Environmental Design (CPTED) principles and practices is the leading cause of these issues and crimes. Therefore, the principles of CPTED, of which we have considered three (surveillance, access control, and maintenance), are among the most important factors considered when evaluating safety in the old bus complex in Zarqa for female students. To assess how the presence or absence of these components affected the complex's safety.

Girls are the group within the complex most susceptible to harm and crime, as was evident during the data collection phase. The study's premise was that girls feel less secure, frightened, and insecure when using the complex. However, using it is unavoidable for college students. The information revealed that the level of safety felt by female students inside the compound varies depending on the time of day, the presence of other people, and the amount of time the females spend there.

In terms of *surveillance*, the research found that people in the station made female students feel safer during the daytime because others were around (natural surveillance). However, this factor

decreases significantly during the nighttime due to poor lighting and a lack of genuine leadership in the complex. Therefore, it needs to be improved to apply the principles of surveillance at all times of the day. There is no indication of active surveillance anywhere in the complex. It is one of the issues that cause female students to feel insecure.

In terms of *access control*, the majority of the participating students thought that the complex had numerous entrances and exits, which might make it challenging to control the movement of criminals inside the complex and increase its vulnerability. In addition, most female students thought that control over these entrances by the police or the built environment did not exist and did not serve security for the old bus complex.

The third aspect of the complex that was looked at was *maintenance*, and the study found that female students were aware of the lack of interest in the location in this area, which acted as a general invitation to criminals to commit crimes at the bus station because it was not being cared for. Therefore, these factors affect how the site is used and the opportunities it offers them throughout the day or during their academic years. They also contributed to the development of the female students' perception of the bus complex as a dangerous place to use, especially when surveillance is at its lowest.

Given the results of the study, it is recommended that the principles of CPTED be put into practice on a larger scale by first raising the level of active and passive surveillance in the station and including more neighborhoods and events to draw people or by installing cameras, police officers, etc. Additionally, it should be taken into account to maintain the location by creating committees specifically for maintenance or imposing the duty on on-site visitors. Last but not least, closing one of the southern or one of the western entrances to the compound and keeping watch over the other entrances during the day while they are locked at night may help to reduce crime problems in the neighborhood and boost the confidence and sense of safety of female students while using the former Zarqa complex.

Discussion

The study of victimization, criminality, and crime in specific locations is known as environmental criminology. It also looks at how businesses and individuals who work in space describe their operations geographically and how spatial factors impact those descriptions. Each of the three elements that Miles et al. (2021) identified as necessary and sufficient for a crime to occur was present throughout this study.

Zarqa Old Bus Station adhered to the CPTED surveillance, access control, and maintenance principles. Despite not being explicitly treated as a separate CPTED metric, police presence was noted as an additional check measure demonstrating other measures' efficacy. These recommendations for interventions are comparable to those made by Newman (1972, 1996) when he discussed how to change an urban environment to reduce crime. However, according to the audit's findings, Zarqa Old Bus Station generally needs to be adequately integrated with these principles. The research discovered this, and responses from those polled about their opinions on the questionnaire's guiding principles supported it.

Conclusion

According to the research's recommendations, future research should focus more on the ownership and territoriality of Zarqa Old Bus Station. It might also result in using novel and distinctive theories and methodologies. In addition, the bus station needs to be a secure location with all the necessary components.

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TiO₂ Deactivation Process During Photocatalytic Ethanol Degradation in the Gas Phase

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Abstract— The efficiency of the semiconductor TiO₂ needs to be improved to be an effective tool for pollutant removal. To improve the efficiency of this semiconductor, it is necessary to deepen the knowledge of the processes that take place on its surface. In this sense, the deactivation of the catalyst is one of the aspects considered relevant. In order to study this point, the processes of deactivation of TiO₂ during the gas phase degradation of ethanol have been studied. For this, catalysts with only the anatase phase (SA and PC100) and catalysts with anatase and rutile phases (P25 and P90) have been selected. In order to force the deactivation processes, different cycles have been performed, adding ethanol gas but avoiding the degradation of acetates to determine their effect on the process.

The surface concentration of fluorine on the catalysts was semi-quantitatively determined by EDAX analysis. The photocatalytic experiments were done with four commercial catalysts (P25, SA, P90, and PC100) and the two fluoride catalysts indicated above. The interaction and photocatalytic degradation of ethanol were followed by Fourier transform infrared spectroscopy (FTIR).

EDAX analysis has revealed the presence of sodium on the surface of fluorinated catalysts. In FTIR studies, it has been observed that the acetates adsorbed on the anatase phase in P25 and P90 give rise to electron transfer to surface traps that modify the electronic states of the semiconductor. These deactivation studies have also been carried out with fluorinated P25 and SA catalysts (F-P25 and F-SA) which have observed similar electron transfers but in the opposite direction during illumination. In these materials, it has been observed that the electrons present in the surface traps, as a consequence of the interaction Ti-F, react with the holes, causing a change in the electronic states of the semiconductor. In this way, deactivated states of these materials have been detected by different electron transfer routes.

It has been identified that acetates produced from the degradation of ethanol in P25 and P90 are probably hydrated on the surface of the rutile phase. In the catalysts with only the anatase phase (SA and PC100), the deactivation is immediate if the acetates are not removed before adsorbing ethanol again. In F-P25 and F-SA has been observed that the acetates formed react with the sodium ions present on the surface and not with the Ti atoms because they are interacting with the fluorine.

Keywords— photocatalytic degradation, ethanol, TiO₂, deactivation process, F-P25.

Ultrasonic-Based Defect Identification Using Uniform Manifold Approximation and Projection in Concrete

Prashanth Gunasekaran, Mehrisadat Makki Alamdari, Hamid Vali Pour Goudarzi

Abstract—Damage identification using non-destructive techniques can aid in structural health monitoring and rehabilitation applications, especially in common construction materials like concrete. This paper attempts to provide a proof-of-concept, for the application of a novel feature extraction algorithm based on Uniform Manifold Approximation and Projection (UMAP), to detect highly common strength impacting defects such as cracking in concrete. To this aim, ultrasonic testing is adopted to transmit pressure waves through discretised locations along an unreinforced concrete test specimen. The transmitted time signals are received by 54kHz receivers and analysed with UMAP, resulting in highly reliable data separation between healthy and damaged sections – showing better results compared to competing wavelet decomposition frameworks. The key contribution of the study lies in the successful application of UMAP, for the first time, for damage detection in unreinforced concrete, with minimal calibration, compared to prevailing wavelet-based approaches. This demonstration in this area opens the door to future works, which may then scrutinise in-depth material-specific factors for the aim of defect characterisation using UMAP.

Keywords— Ultrasonic testing, Pressure wave, Wavelet decomposition, Feature extraction, Damage identification

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Interpretation of the Russia-Ukraine 2022 War via N-gram Analysis

Elcin Timur Cakmak, Ayse Oguzlar

Abstract— This study presents the results of the tweets sent by Twitter users on social media about the Russia-Ukraine war by bigram and trigram methods. On February 24, 2022, Russian President Vladimir Putin declared a military operation against Ukraine and all eyes were turned to this war. Many people living in Russia and Ukraine reacted to this war and protested and also expressed their deep concern about this war as they felt the safety of their families and their futures were at stake. Most people, especially those living in Russia and Ukraine, express their views on the war in different ways. The most popular way to do this is through social media. Many people prefer to convey their feelings using Twitter, one of the most frequently used social media tools. Since the beginning of the war, it is seen that there are thousands of tweets about the war from many countries of the world on Twitter. These tweets accumulated in data sources is extracted using various codes for analysis through Twitter API and analysed by Python programming language. The aim of the study is to find the word sequences in these tweets by n-gram method which is known for its widespread use in computational linguistics and natural language processing. The tweet language used in the study is English. The data set consists of the data obtained from Twitter between February 24, 2022 and April 24, 2022. The tweets obtained from Twitter using the #ukraine, #russia, #war, #putin, #zelensky hashtags together were captured as raw data, and the remaining tweets is included in the analysis stage after they are cleaned through the preprocessing stage. In the data analysis part, the sentiments are found to present what people send as a message about the war in Twitter. Regarding to this, negative messages make up the majority in all the tweets as a ratio of %63,6. Furthermore, the most frequently used bigram and trigram word groups are found. Regarding to the results the most frequently used word groups are “he, is”, “I, do”, “I, am” for bigrams. Also, the most frequently used word groups are “I, do, not”, “I, am, not”, “I, can, not” for trigrams. In the machine learning phase, the accuracy of classifications are measured by Classification and Regression Trees (CART) and Naïve Bayes (NB) algorithms. The algorithms are used seperately for bigrams and trigrams. We gained the highest accuracy and F-measure values by NB algoritm, and the highest precision and recall values by CART algorithm for bigrams. On the other hand, the highest values for accuracy, precision, and F-measure values are achieved by CART algoritm, and the highest value for recall is gained by NB for trigrams.

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Keywords—Classification Algorithms, Machine Learning, N-gram, Twitter.

I. INTRODUCTION

MOST of the people reflects their thoughts and feelings by using social media. It is one of the populer ways to explain what they think about on a specific topic they are concerned. For a time, many people are concerning about Russia-Ukraine War 2022. That’s why most of them prefer to use Twitter to sent many messages about their feelings. The people living in Russia and Ukraine are concerning about their families and futures, and also many people those living in other countries have thoughts about this war. The aim of this paper is to figure out the main idea of these messages by machine learning techniques and features.

II. METHOD

In this paper, word bigram and trigram methods are used to calculate the probabilities of the tweets. These methods are a branch of Natural Language Processing (NLP). NLP is a sub-discipline of computer science providing a bridge between natural languages and computers. It helps empower machines to understand, process, and analyze human language [1]. n-grams are sequences of characters or words extracted from a text [2]. Let’s take “Studying machine learning is exciting” as an example sentence. Regarding to this, a bigram is a two-word sequence like “studying machine”, “machine learning”, “learning is” or ”is exciting”, and a trigram is a three-word sequence like “studying machine learning”, “machine learning is” or “learning is exciting”. The data set consists of tweets taken from Twitter using #ukraine, #russia, #war, #putin, #zelensky hashtags. These tweets drawn by Twitter API. The time period of the data is February 24 and April 24, 2022. The analysis is completed in Python using NLTK library. After getting the data set, it is cleaned through the preprocessing stage, the remaining tweets are included in the analysis stage. At this stage, punctuation marks, symbols, upper and lower case letters, numbers and links in the raw data were separated from the raw data. In addition, in the sentence such as pronouns, prepositions, conjunctions; however, the words that do not have a meaning for analysis were also included in the list called "stop words" and cleaned and the preprocessing phase was completed. By removing these words from the text to be analyzed, there will be a decrease in the number of

words and the accuracy of the analysis will increase significantly. After the preprocessing phase, sentiment results are calculated to find out the polarities in the dataset and classification made. Also here, the data set is divided into two parts as %70 for training group, and %30 for test group.

In the feature extraction phase, we used n-gram technique. [3] Let X_i denote the value of the word, $P(X_i)$ the probability of X_i and n the number of words. For the joint probability of each word in a sequence having a particular value $P(X_1=w_1, X_2=w_2, X_3=w_3, \dots, X_n=w_n)$ we'll use $P(w_1, w_2, \dots, w_n)$. Now we will decompose this probability using the chain rule of probability:

$$P(X_1 \dots X_n) = P(X_1)P(X_2|X_1)P(X_3|X_{1:2}) \dots P(X_n|X_{1:n-1}) \\ = \prod_{k=1}^n P(X_k|X_{1:k-1})$$

(1)

Then, we get:

$$P(w_{1:n}) = P(w_1)P(w_2|w_1)P(w_3|w_{1:2}) \dots P(w_n|w_{1:n-1}) \\ = \prod_{k=1}^n P(w_k|w_{1:k-1})$$

(2)

In machine learning phase, classification algorithms are used to measure the accuracy of classifications created. In this analysis, Classification and Regression Trees (CART) and Naïve Bayes (NB) algorithms are used.

The CART algorithm, introduced by Breiman in 1984, is a binary classification method. The division condition is determined according to the Gini index. Each division operation is requires division into subgroups. Each subset then divides into the next test feature. The division continues until the data can no longer be partitioned.

Let D be a data set containing n samples and P_j the relative probability of D in category j . The Gini coefficient is expressed as:

$$Gini(D) = 1 - \sum_{j=1}^n P_j^2 \quad (3)$$

The purpose of the Gini coefficient is to separate the largest number of categories in the data from other categories at different nodes. When the Gini value is smaller, the category distribution of the sample is more uneven. This means that the higher the category purity in the subset created using the split point, the greater the ability to distinguish between different categories.

The Naïve Bayes algorithm is a probabilistic classification method based on the assumption of conditional independence between different variables in the data set [4]. It is based on Bayes theorem.

In probability theory, Bayes' theorem relates the conditional and marginal probabilities of two random events. Observations are often used to calculate given posterior probabilities. For a given vector $x = (x_1, x_2, \dots, x_n)$ there are k probabilities, and the probability is $p(C_k|x_1, x_2, \dots, x_n)$. When Bayes' theorem is applied;

$$p(C_k|x) = \frac{p(x|C_k)p(C_k)}{p(x)} = \frac{p(x_1, x_2, \dots, x_k | C_k)p(C_k)}{p(x_1, x_2, \dots, x_k)} \quad (4)$$

obtained.

Assuming that each property is conditionally independent of all other properties, only the numerator should be used, since the denominator remains constant for all classes. Thus, the Naïve Bayes probability model is obtained [5].

$$p(C_k|x) \propto p(C_k)p(x_1|C_k)p(x_2|C_k) \dots p(x_n|C_k) \\ \propto p(C_k) \prod_{i=1}^n p(x_i|C_k) \quad (5)$$

The Naïve Bayes Classifier chooses the class with the maximum value for $p(C_k) \prod_{i=1}^n p(x_i|C_k)$.

In supervised machine learning, there are different ways to evaluate the performance of learning algorithms and classifiers. Model performance measures are generated from a confusion matrix where correctly and incorrectly recognized samples are recorded for each class. A confusion matrix for binary classification is given in Table 1 [6].

TABLE I
CONFUSION MATRIX

		Predicted	
		Positive	Negative
Actual	Positive	True Positive (TP)	False Negative (FN)
	Negative	False Positive (FP)	True Negative (TN)

The confusion matrix is a very popular measure used when solving classification problems. This matrix can be applied to binary classification and multiclass classification problems [7]. A confusion matrix of size $n \times n$ used for classification shows the predicted and actual classification. Here n is the number of different classes. Table 1 shows a confusion matrix for $n = 2$ [8].

In the given confusion matrix the definition are refer to;

TP: Number of correctly classified predictions among positive predictions,

FP: The number of misclassified predictions within the positive predictions,

TN: Number of correctly classified predictions among negative predictions,

FN: Number of misclassified predictions in negative predictions.

The classification criteria that can be obtained through these definitions are:

Accuracy (A): It is obtained by dividing the number of correctly classified samples to the total number of samples. It is the most frequently used criterion among model performance criteria.

$$A = \frac{TP + TN}{TP + TN + FP + FN} \tag{6}$$

Precision (P): It is the ratio of the number of correctly classified positive samples to the total number of positive predicted samples.

$$P = \frac{TP}{TP + FP} \tag{7}$$

Recall (R): It is the ratio of the number of correctly classified positive samples to the total number of positive samples. There is an inverse relationship between precision and sensitivity.

$$R = \frac{TP}{TP + FN} \tag{8}$$

F-measure (F): It is the harmonic mean of the precision and sensitivity criteria, which are among the model performance criteria.

$$F = 2 * \frac{P * R}{P + R} \tag{9}$$

The methodology of the analysis given in this section shown in Fig. 1 [9].

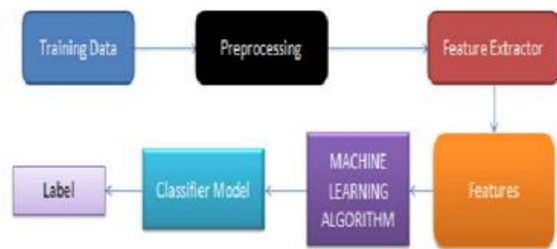


Fig. 1 The methodology of the analysis

This methodology is taken as a guide in the analysis phase.

III. EXPERIMENTAL RESULTS

The data set consists of 5691 raw data, and after preprocessing phase the number of remaining data became 4162. Regarding to this remaining data, the sentiment graph is created by the polarity of results. This graph is shown in Fig. 2.

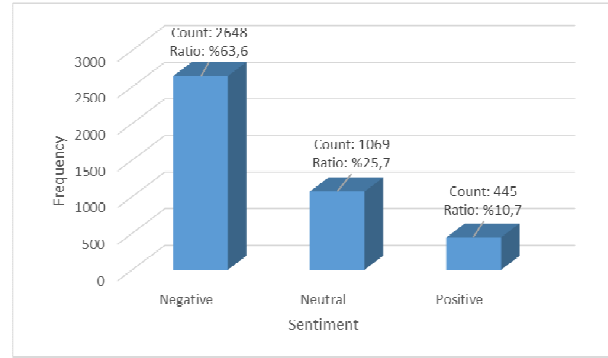


Fig. 2 Sentiment Graph

As seen in Fig. 2, the number of negative tweets are 2648, the number of positive tweets are 445, and the number of neutral tweets are 1069. This shows people sent tweet on Twitter about the war have negative opinion overall. There is an important difference between the neutrals and the negatives. Where the ratio of negatives is %63,6, the ratio of neutrals is %25,7. The ratio of positives are just %10,7.

In this section, we compared the data set for bigram and trigram results. Here the screenshot of the analysis on Python is given as bigram in Fig. 3.

```

TextBlob(text).ngrams(2)

[WordList(['War', 'is']),
 WordList(['is', 'the']),
 WordList(['the', 'thing']),
 WordList(['thing', 'that']),
 WordList(['that', 'I']),
 WordList(['I', 'had']),
 WordList(['had', 'to']),
 WordList(['to', 'leave']),
 WordList(['leave', 'my']),
 WordList(['my', 'hometown']),
 WordList(['hometown', 'On']),
 WordList(['On', '15']),
 WordList(['15', 'April']),
 WordList(['April', 'the']),
 WordList(['the', 'Ukrainian']),
 WordList(['Ukrainian', 'parliament']),
 WordList(['parliament', 'declared']),

```

Fig. 3 Python screenshot of the bigram data

As seen in Fig. 3, the sentences are divided into small groups including just two words. Also trigrams are given in Fig. 4. Trigrams include just three words. These bigram and trigrams show the first few sentences of the complete data.

```

TextBlob(text).ngrams(3)

[WordList(['War', 'is', 'the']),
 WordList(['is', 'the', 'thing']),
 WordList(['the', 'thing', 'that']),
 WordList(['thing', 'that', 'I']),
 WordList(['that', 'I', 'had']),
 WordList(['I', 'had', 'to']),
 WordList(['had', 'to', 'leave']),
 WordList(['to', 'leave', 'my']),
 WordList(['leave', 'my', 'hometown']),
 WordList(['my', 'hometown', 'On']),
 WordList(['hometown', 'On', '15']),
 WordList(['On', '15', 'April']),
 WordList(['15', 'April', 'the']),
 WordList(['April', 'the', 'Ukrainian']),
 WordList(['the', 'Ukrainian', 'parliament']),
 WordList(['Ukrainian', 'parliament', 'declared']),

```

Fig. 4 Python screenshot of the trigram data

The mostly used first 10 bigrams shown on graph in Fig. 5. Regarding to the graph, “he, is”, “I, do”, “I, am”, “do, not”, “I, can’t” are the most used word pairs in the dataset.

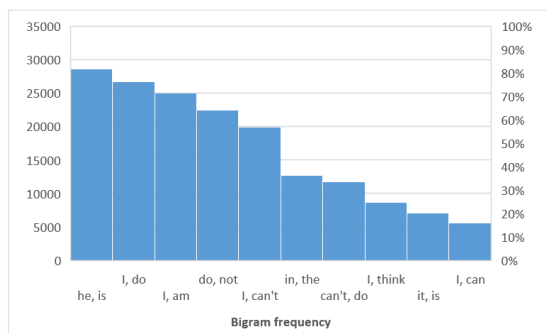


Fig. 5 Bigram frequency

The frequently used trigrams are given in Fig. 6. The figure shows that “I, do, not”, “I, am, not”, “I, can, not”, “do, not, think” and “he, is, not” are the most frequently used trigrams in the dataset.

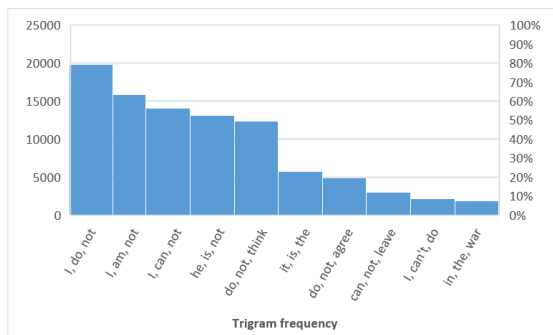


Fig. 6 Trigram frequency

In the machine learning phase, Classification and Regression Trees (CART) and Naïve Bayes (NB) algorithms

are used to measure the accuracy of classifications created. In this phase, algorithms are applied separately for bigrams and trigrams.

Classifier	Accuracy (A)	Precision (P)	Recall (R)	F-measure (F)
CART	0.8756	0.8643	0.9259	0.9032
NB	0.9278	0.8234	0.8977	0.9168

Fig. 7 Machine learning results for bigrams

Classifier	Accuracy (A)	Precision (P)	Recall (R)	F-measure (F)
CART	0.9148	0.8912	0.8867	0.9289
NB	0.9126	0.7967	0.9134	0.9036

Fig. 8 Machine learning results for trigrams

The machine learning results are given in Fig. 7 and Fig. 8 respectively. Fig. 7 shows accuracy (A), precision (P), recall (R) and F-measure (F) values for bigrams. The highest accuracy and F-measure values, respectively 0.9278 and 0.9168, are gained by NB classifier for bigrams. Precision value for CART algorithm, 0.8643, is higher than precision value for NB, 0.7967. Also for recall value, 0.9134, the highest value is gained by NB.

In Fig. 8, the machine learning results for trigrams are given. The highest accuracy, precision and F-measure values are gained with CART algorithm, 0.9148, 0.8912 and 0.9289 respectively. The recall value for NB classifier is 0.9134.

IV. CONCLUSIONS AND FUTURE WORK

Nowadays many people in the world are concerning about Russia-Ukraine War 2022. The people live in these or other countries have many thoughts about this situation. They show their feelings in many ways. One of them is sending messages as tweets on Twitter.

On the other hand, artificial intelligence is a very attractive studying field for researchers. It keeps its popularity for a long time. Artificial intelligence hosts many important subjects. One of them is analysing tweets on Twitter by machine learning techniques.

In this paper, tweets from February 24, 2022 – April 24, 2022 are drawn from Twitter by Twitter API as a dataset. The data set consisted of 5691 tweets as raw data. However the raw data is not available to use as it is, it has to be purified from punctuations, adjectives, blanks, images, etc. For this reason we applied preprocessing transactions to clean the raw data. After this phase, we had 4162 cleaned data left. This cleaned data became available to use in machine learning algorithms.

Initially, we found out the sentiments in the dataset. As a result, 2648 negative tweets, 445 positive tweets, and 1069 neutral tweets are detected. It is seen that the data set mostly consists of negative tweets. The ratio of negative tweets of all the dataset is %63,6. The ratio of neutrals and positives are %25,7 and %10,7 respectively.

Secondly, we applied word bigram and trigram techniques to the data set. The sentences are divided into small groups including just two words for bigrams, and three words for trigrams. Regarding to the results the most frequently used word groups are “he, is”, “I, do”, “I, am” for bigrams. Also, the most frequently used word groups are “I, do, not”, “I, am, not”, “I, can, not” for trigrams.

Furthermore, in the machine learning phase, Classification and Regression Trees (CART) and Naïve Bayes (NB) algorithms are used to measure the accuracy of classifications created. In this phase, we applied the algorithms separately for bigrams and trigrams. For bigrams, NB gives the highest accuracy and F-measure values, and CART algorithm gives the highest scores for precision and recall values. When we applied these algorithms to the trigrams, we found out that CART algorithm has the highest values for accuracy, precision, and F-measure values. On the other hand, NB has the highest value for NB classifier.

As a future work, the time period for the dataset can be expanded as one year or more. Besides, the number of machine learning techniques applied to the data can be increased. The data set can be analysed with Random Forest, k-NN classifiers. Also the dataset can be searched for n-grams technique. So that more than three word groups would be analysed. All these can be helpful to reach more detailed results.

ACKNOWLEDGMENT

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Evolutionary Advantages of Loneliness with an Agent-Based Model

David Gottlieb, Jason Yoder

Abstract—The feeling of loneliness is not uncommon in modern society, and yet, there is a fundamental lack of understanding in its origins and purpose in nature. One interpretation of loneliness is that it is a subjective experience that punishes a lack of social behavior, and thus its emergence in human evolution is seemingly tied to the survival of early human tribes. Still, a common counterintuitive response to loneliness is a state of hypervigilance, resulting in social withdrawal, which may appear maladaptive to modern society. So far, no computational model of loneliness' effect during evolution yet exists; however, agent-based models (ABM) can be used to investigate social behavior, and applying evolution to agents' behaviors can demonstrate selective advantages for particular behaviors. We propose an ABM where each agent contains four social behaviors, and one goal-seeking behavior, letting evolution select the best behavioral patterns for resource allocation. In our paper, we use an algorithm similar to the boid model to guide the behavior of agents, but expand the set of rules that govern their behavior. While we use cohesion, separation, and alignment for simple social movement, our expanded model adds goal-oriented behavior, which is inspired by particle swarm optimization, such that agents move relative to their personal best position. Since agents are given the ability to form connections by interacting with each other, our final behavior guides agent movement toward its social connections. Finally, we introduce a mechanism to represent a state of loneliness, which engages when an agent's perceived social involvement does not meet its expected social involvement. This enables us to investigate a minimal model of loneliness, and using evolution we attempt to elucidate its value in human survival. Agents are placed in an environment in which they must acquire resources, as their fitness is based on the total resource collected. With these rules in place, we are able to run evolution under various conditions, including resource-rich environments, and when disease is present. Our simulations indicate that there is strong selection pressure for social behavior under circumstances where there is a clear discrepancy between initial resource locations, and against social behavior when disease is present, mirroring hypervigilance. This not only provides an explanation for the emergence of loneliness, but also reflects the diversity of response to loneliness in the real world. In addition, there is evidence of a richness of social behavior when loneliness was present. By introducing just two resource locations, we observed a divergence in social motivation after agents became lonely, where one agent learned to move to the other, who was in a better resource position. The results and ongoing work from this project show that it is possible to glean insight into the evolutionary advantages of even simple mechanisms of loneliness. The model we developed has produced unexpected results and has led to more questions, such as the impact loneliness would have at a larger scale, or the effect of creating a set of rules governing interaction beyond adjacency.

Keywords—agent-based, behavior, evolution, loneliness, social.

Stochastic Approach for Technical-Economic Viability Analysis of Electricity Generation Projects with Natural Gas Pressure Reduction Turbines

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Abstract

Nowadays society is working toward reducing energy losses and greenhouse gas emissions, as well as seeking clean energy sources, as a result of the constant increase in energy demand and emissions. Energy loss occurs in the gas pressure reduction stations at the delivery points in natural gas distribution systems (city gates). Installing pressure reduction turbines (PRT) parallel to the static reduction valves at the city gates enhances the energy efficiency of the system by recovering the enthalpy of the pressurized natural gas, obtaining in the pressure-lowering process shaft work and generating electrical power. Currently, the Brazilian natural gas transportation network has 9,409 km in extension, while the system has 16 national and 3 international natural gas processing plants, including more than 143 delivery points to final consumers. Thus, the potential of installing PRT in Brazil is 66 MW of power, which could yearly avoid the emission of 235,800 tons of CO₂ and generate 333 GWh/year of electricity. On the other hand, an economic viability analysis of these energy efficiency projects is commonly carried out based on estimates of the project's cash flow obtained from several variables forecast. Usually, the cash flow analysis is performed using representative values of these variables, obtaining a deterministic set of financial indicators associated with the project. However, in most cases, these variables cannot be predicted with sufficient accuracy, resulting in the need to consider, to a greater or lesser degree, the risk associated with the calculated financial return. This paper presents an approach applied to the technical-economic viability analysis of PRTs projects that explicitly considers the uncertainties associated with the input parameters for the financial model, such as gas pressure at the delivery point, amount of energy generated by TRP, the future price of energy, among others, using sensitivity analysis techniques, scenario analysis, and Monte Carlo methods. In the latter case, estimates of several financial risk indicators, as well as their empirical probability distributions, can be obtained. This is a methodology for the financial risk analysis of PRT projects. The results of this paper allow a more accurate assessment of the potential PRT project's financial feasibility in Brazil. This methodology will be tested at the Cuiabá thermoelectric plant, located in the state of Mato Grosso, Brazil, and can be applied to study the potential in other countries.

Keywords: Pressure reduction turbine, natural gas pressure drop station, energy efficiency, electricity generation, Monte Carlo methods.

1. Introduction

One of the consequences of industrialization, demographic expansion, and its concentration in urban areas has been the consistent increase in electric power consumption [1]. Energy efficiency is one of the pillars of sustainability because it allows better use of natural resources. The increase of energy efficiency indicators in the various economic segments is a global aspiration, especially in the energy transition we are experiencing.

The Brazilian natural gas transportation network has more than 9,000 km in extension [2]. The system has 16 national and 3 international natural gas processing plants, and several delivery points to final consumers. The Northeast and Southeast grids, pipeline Brazil-Bolivia (GASBOL) and Uruguaiiana-Porto Alegre, are interconnected and are part of an integrated grid. The Lateral-Cuiabá, Uruguaiiana-Porto Alegre, and Urucu-Coari-Manaus pipelines (as well as the Urucu Processing Pole) are considered isolated systems. The isolated system in Maranhão, in the Parnaíba Basin, also deserves mention.

Natural gas consumption is expected to increase due to the growth of the macro-sectors (agriculture and cattle raising, industry, and services). Consequently, the demand for natural gas is expected to increase, which justifies the development of new pipelines and the increase in the capacity of existing pipelines. The Brazilian ten-year energy plan 2031 foresees large investments in natural gas, with the projects for the expansion of the natural gas infrastructure amounting to approximately R\$ 137.86 billion (R\$ 8.87 billion foreseen and R\$ 128.99 billion in indicative projects).

Natural gas is transported by pipelines under high pressure. This is necessary to reach the flow demanded by consumers and overcome the pressure losses due to the extensive gas pipeline in the country. At the delivery points (city gate), the gas must have lowered pressure before being supplied to the consumers (industry, commerce, TPSs, etc.). The pressure lowering is typically performed by a pressure reducing valve, as shown in Figure 1 (a). Besides lowering the pressure, other physical processes are also performed at city gate, such as filtration and flow measurement, and the gas is then distributed to consumers.

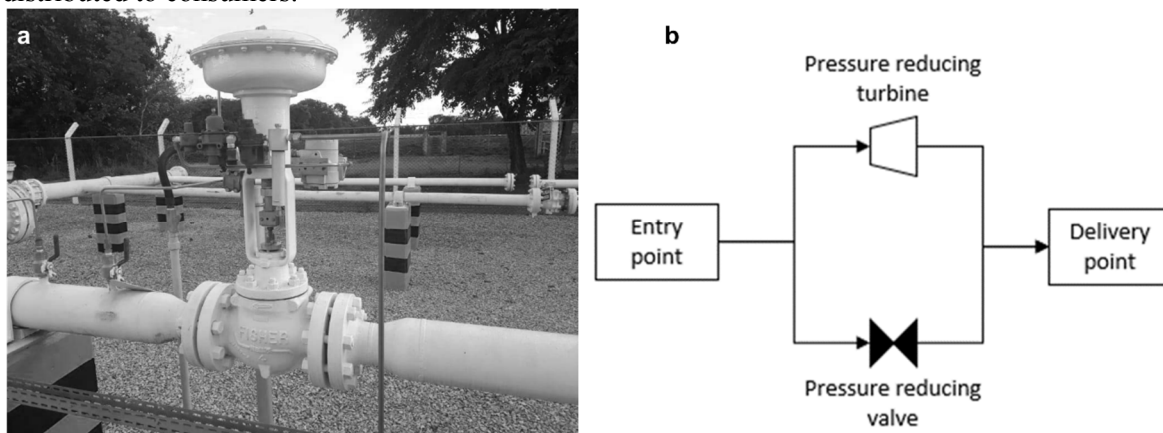


Figure 1: (a) Pressure reducing valve in the city gate of thermal electric power plant [33], (b) simplified flowchart of the pressure reducing turbine in the pressure reduction process.

Pressure-reducing valves perform this by imposing a controlled pressure drop on the system, causing the gas to flow through a throttled section. Because of the pressure reduction, a gas temperature decrease is observed after the valve. This is an isenthalpic process, with no work performed.

Currently, city gates use pressure-reducing valves that perform this function without taking advantage of the enthalpy of the pressurized natural gas, i.e., without doing any work but simply giving the process a loss of pressure. One can employ pressure-reducing turbines (recovery turbines) installed in parallel to the current reducing valves to take advantage of this energy, as illustrated in Figure 1 (b). Its operation

is substitutive to the valve, obtaining in the pressure-lowering process shaft work and generating electrical power and cold.

2. Methodology

Usually, the financial analysis of projects is based on estimates for the future cash flow of the project, obtained from forecasts for several variables. The initial cash flow analysis is performed through representative values for the variables considered, allowing the calculation of deterministic financial indicators. However, these variables cannot be predicted with 100% accuracy [4], indicating the importance of considering, to a greater or lesser degree, the risk associated with the financial return obtained for the project. It is possible to work with uncertainties associated with a power generation project through three basic methods: sensitivity analysis, scenario analysis, and Monte Carlo methods. Sensitivity analysis consists of verifying the impact of variations in the values of a variable on the project's financial indicators, allowing the estimation of the parameters to which the financial indicators are more sensitive, and also indicating which parameters should be estimated with greater precision.

If sensitivity analysis allows measuring the effects on project profitability caused by variations in the values of parameters of interest, one at a time, scenario analysis allows the creation of a set of alternative scenarios to consider simultaneous variations of variables. The typical procedure consists of analyzing three canaries: base, optimistic and pessimistic.

In the Monte Carlo Method (MCM), in the first place, the variables of interest for the stochastic modeling are selected, and values are drawn for each of these variables, based on their joint probability distributions. This set of sampled values constitutes a random scenario, for which a financial analysis will be carried out, obtaining a set of financial indicators conditioned to this scenario. Successive random scenarios are sampled until accurate estimates are obtained. At the end of the simulation process, it is possible to calculate the expected values of financial indicators (eg NPV) as well as their associated confidence intervals.

Figure 2 illustrates the Monte Carlo method scheme.

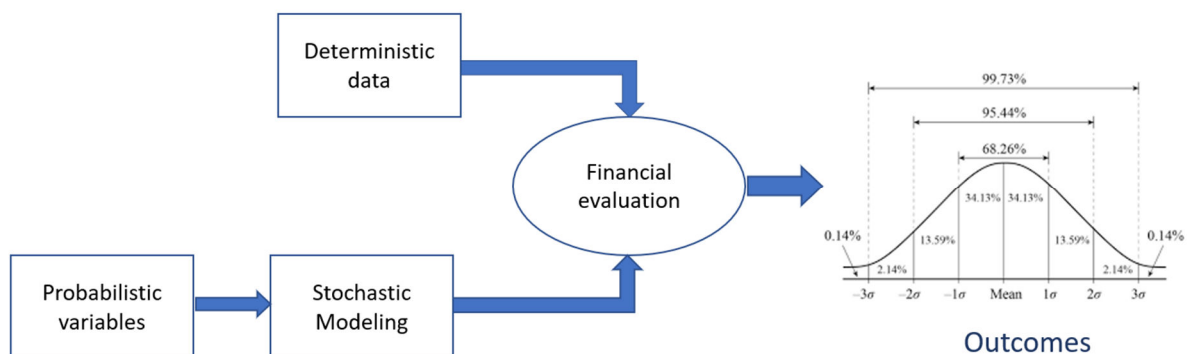


Figure 2: Probabilistic approach for financial risk assessment.

2.1 Risk Indicators

An efficient way to assess the risk of a generation project consists of building random but probable scenarios from the probability distributions of the variables of interest. In this case, the uncertainties in the parameters are explicitly considered, using probabilistic techniques. Various statistics can be used as a measure of project risk, such as the expected value of financial indicators, their variances, semivariances, etc. For example, the expected value of a financial indicator I , $E(I)$, can be given by Equation 1, where x is the vector representing a scenario to be analyzed, with each component representing the state of a random variable, X represents state space, i.e., the set of all possible scenarios x , resulting from combinations of the considered random variables, $P(x)$ is the probability of scenario x and $I(x)$ is the result obtained for financial indicator I in scenario x analyzed.

$$E(I) = \sum_{x \in X} I(x)P(x) \quad (1)$$

The calculation of statistics can be performed using analytical techniques or Monte Carlo simulation. Analytical methods have very attractive characteristics: they are precise, computationally efficient, and allow a better understanding of the relationship between the input and output variables in the probabilistic model adopted. However, many times, to make the problem analytically tractable, strong assumptions are used to simplify the problem, which can make its practical application unfeasible. In these cases, there is a need to resort to statistical simulation techniques [5].

2.2 Stochastic Approach

Figure 3 shows a flowchart containing the steps that are part of the methodology used in this work. The financial analysis will be approached from a probabilistic perspective, using thousands of scenarios through Montecarlo simulations. For this purpose, it is necessary to assess the risk of the most relevant variables, which in the case of energy generation projects are the variables price of energy and power generation of the plant to be installed [3]. This type of approach also allows performing sensitivity analysis of important quantities to make a decision.

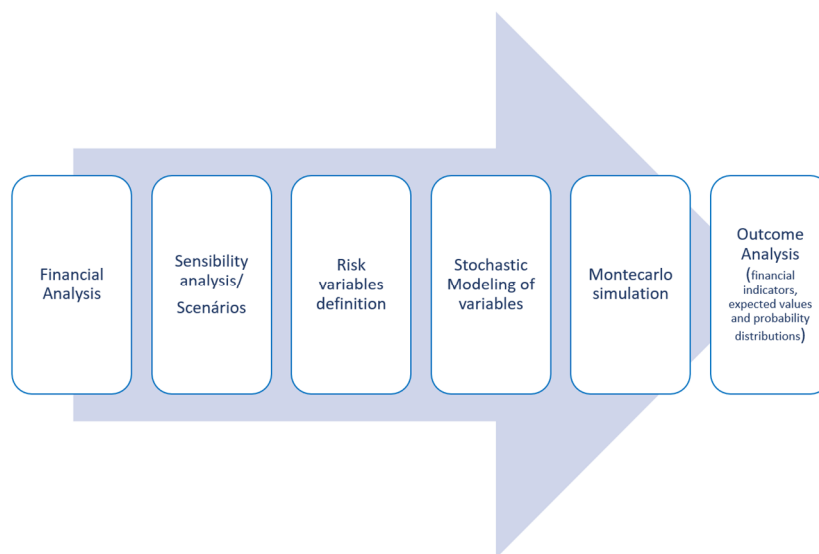


Figure 3: Approach employed in this paper.

2.2.1 Stochastic variables

Natural gas transport pressure (PG) – Variable that represents the pressure (in bar) that arrives at the Citygate. This variable defines the pressure that will be available at the TRP inlet for it to generate electrical energy.

PRT energy generation (EG) – Variable that represents the generation of electrical energy at the output of the PRT (in MWh). This variable depends directly on the pipeline pressure (PG), so it is also a random variable.

Energy price (EP) – Variable that represents the future price of energy (in R\$/MWh). In Brazil, the energy price on the spot market (short-term price), for the purchase and sale of energy, is defined by

the short-term marginal cost (CMO), which is directly related to hydrological conditions, that is, to the level of storage. of reservoirs, among other variables. Therefore, PE is a random variable.

2.2.2 Deterministic variables

Capital cost – Represents the opportunity cost of the investor's capital.

CAPEX – Investment required to acquire a pressure reduction turbine (PRT), plus all costs associated with its installation.

OPEX – Investment necessary for maintenance and operation of the pressure reduction turbine (PRT) during its life cycle.

Project life cycle – Corresponds to the operation (in years) of the pressure reduction turbine (PRT).

2.2.3 Mathematical modeling for financial valuation

The indicator used to quantify the financial viability of the project is the NPV (Net Present Value), according to Equation 2, where I_0 represents the total investment made at time 0, $E[CF_t]$ represents the expected cash flow at time t, i represents the opportunity cost of the investor's capital, and n represents the project life cycle.

$$NPV = -I_0 + \sum_{t=0}^n \frac{E[CF_t]}{(1+i)^t} \quad (2)$$

A project will be economically attractive if its NPV is positive, meaning that its cash flows are sufficient for the entrepreneur to recover the investments made plus a return either equal or greater than its cost of capital [6]. As can be seen in Equation 3, the cash flow CF depends on two random variables; energy price EP and energy generation (EG) from the pressure reduction turbine (PRT), therefore the cash flow is a stochastic variable, resulting in a stochastic NPV indicator with a specific probability distribution.

Finally, it can be seen in Equation 4, that the power generation produced by PRT depends on the pipeline pressure. To calculate the PRT's energy generation, a mathematical modeling was performed, which will be presented in the following section of this paper.

$$CF_t = EP_t \cdot EG_t - OPEX_t \quad (3)$$

$$EG_t = f(PG_t) \quad (4)$$

2.2.4 PRT Energy generation modeling

To perform the thermodynamic modeling of the pressure-reducing turbine, one must consider the irreversibilities that exist in the systems. It is desirable to have some parameters to quantify the degree of energy degradation in engineering devices working in isolation under steady-state flow conditions, such as turbines. However, in the first place, it is necessary to adopt an ideal process that serves as a model, although some heat transfer between these devices and their surroundings is inevitable. The

process that can serve as a suitable model for devices with the steady-state and adiabatic flow is the isentropic process.

The mathematical model that describes the behavior of the pressure-reducing turbine follows the laws of conservation of mass and energy (first law of thermodynamics), as presented in Equation 5.

$$\frac{dE}{dt} = \dot{\Phi} + \dot{W} + \sum \dot{m}_1 \cdot \left(h_1 + \frac{V_1^2}{2} + g \cdot Z_1 \right) - \sum \dot{m}_2 \cdot \left(h_2 + \frac{V_2^2}{2} + g \cdot Z_2 \right) \quad (5)$$

Where dE/dt is the energy variation over time. $\dot{\Phi}$ is the heat flow, \dot{W} is work flow, h_1 is the inlet specific enthalpy, h_2 is the outlet specific enthalpy, V_1 is the inlet speed, V_2 is the outlet speed, g is the gravitational acceleration, Z_1 is the inlet height and Z_2 is the outlet height

Since the model adopts a steady-state operation, that is, there is no variation in the total energy over time, therefore $dE/dt = 0$. The model can be simplified by considering that the input and output velocities are equal ($V_1 = V_2$) and there is no differential in the inlet and outlet heights ($Z_1 = Z_2$). The general equation of energy conservation was reduced to Equation 6.

$$\dot{\Phi} + \dot{W} + \sum \dot{m}_1 \cdot h_1 - \sum \dot{m}_2 \cdot h_2 = 0 \quad (6)$$

The kinetic and potential energy variations in a fluid stream flowing through the turbine are small compared to the enthalpy variation and can be neglected. Considering that there is no change in the mass of gas in the turbine ($\dot{m}_1 - \dot{m}_2 = 0$), Equation 6 can be simplified to Equation 7.

$$\dot{W} = \dot{m} \cdot (h_1 - h_2) \quad (7)$$

Isentropic efficiency (η_s) shows how close the real process is to the ideal process. For a turbine operating under steady-state and isentropic conditions, the efficiency is the ratio between the actual work produced and the isentropic work, as shown in Equation 8.

$$\eta_s = \frac{\text{real turbine work}}{\text{turbine isentropic work}} = \frac{w_r}{w_s} \quad (8)$$

The efficiency of an isentropic turbine can be given by the enthalpy variation, as in Equation 9, where h_2 e h_{2s} are respectively the enthalpy values in the output state for the real and isentropic processes.

$$\eta_s = \frac{h_1 - h_2}{h_1 - h_{2s}} \quad (9)$$

Knowing the value of the isentropic efficiency (η_s) it is possible to determine the output enthalpy of the actual process (h_2), and by the difference between the inlet and outlet enthalpy, multiplied by the mass flow of the gas (Equation 6), it is possible to find the shaft work (\dot{W}) done by the turbine. To

obtain the electrical power of the pressure-reducing turbine (\dot{W}_e), the shaft work was multiplied by the efficiency of the speed reducer (η_r) that typically exists between the turbine connection and the generator, and by the efficiency of the generator itself (η_g), as presented in Equation 10.

$$\dot{W}_e = \dot{W} \cdot \eta_r \cdot \eta_g \quad (10)$$

The system's mathematical model was used in a computational algorithm implemented in the EES software (Engineering Equation Solver), which allows the verification of the energy generation capacity with the implementation of the pressure-reducing turbine at the natural gas delivery points in all the transportation pipelines in Brazil.

The first step was to map all the existing natural gas delivery points in Brazil and which are the transport operators. This information is available on the WEBMAP platform from the Brazilian Energy Research Office [7]. To obtain the data for average inlet pressure and volume of natural gas at each delivery point, the data released by the National Agency of Petroleum, Natural Gas and Biofuels (ANP) were used [8]. Knowing the utility for each delivery point, it was possible to access the technical operating reports where the average delivery pressure at these points is provided. These data are presented for TPSs.

The gas inlet temperatures in all city gates were considered equal due to the unavailability of this information for all points. As a reference for this temperature, the value of 30°C informed by TPS Cuiabá was considered. Some points with inconsistent values were eliminated from the analysis, and the following criteria were adopted for exclusion: average inlet pressure value is lower than the outlet pressure; there is no flow data for the entire period evaluated; there is no information on outlet pressure.

With all model input parameters properly identified (inlet pressure, outlet pressure, temperature, average flow, and maximum flow) it was possible to calculate the average generation potential (\dot{W}_{e_med}) and maximum ($\dot{W}_{e_máx}$) of each delivery point using Equation 10 for the average and maximum flows. In addition, the annual electric generation (E_{annual}) of these same points was also calculated using the average generation potential (\dot{W}_{e_med}) multiplied by the number of hours in the year (8.760 hours) using Equation 11.

$$E_{annual} = \dot{W}_{e_med} \cdot 8760 \quad (11)$$

3. Application and Results

Next, the results of the application of the proposed methodology will be presented. For this purpose, data from TPP Cuiabá will be used, and a PRT will be installed to increase the overall energy efficiency of the plant.

3.1 Power Generation

To calculate the financial viability of a power generation project, it is necessary to predict the energy generated by this equipment. The fact is that this equipment is not in operation at this stage of the project, so we need to estimate its generation. This estimate is possible by applying the model described in section 2.2.4 of this article (PRT Energy Generation Modeling). The graph in Figure 4 (a) shows the estimated result for the year 2021, using historical data on pressure, mass, etc. It is observed that the maximum daily generation capacity of the projected PRT is close to 45 MWh/day.

However, a synthetic series of 365 data like the one constructed in Figure 4 (a) is insufficient to carry out a probabilistic approach, so it was necessary to look for an alternative way to increase the size of

the data series of the projected PRT generation. For this, the generation time series of TPP Cuiabá from Figure 4 (b) was observed, and similarity with the behavior of the estimated series of the PRT was perceived.

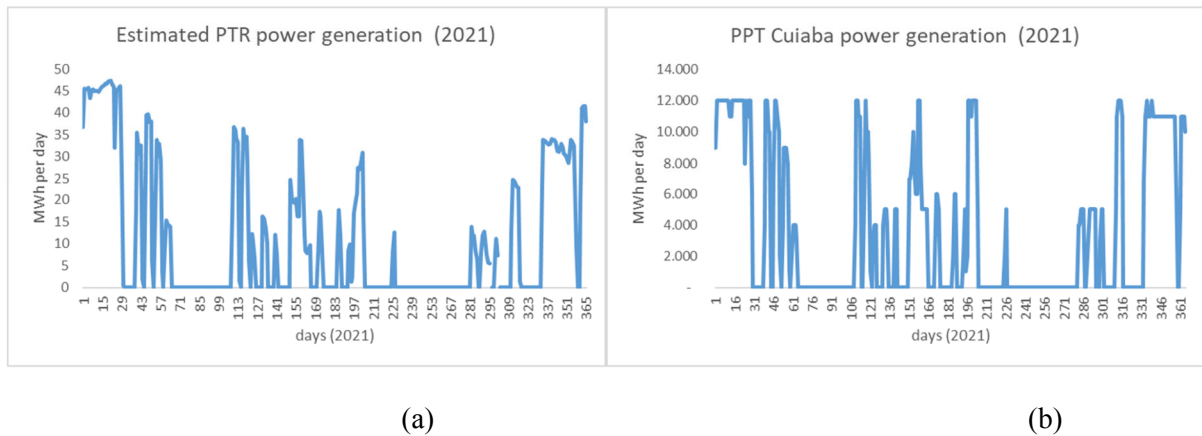


Figure 4: Comparison between estimated PRT power generation and TPP Cuiaba power generation during 2021.

To confirm the similar behavior of the two data series, a linear correlation analysis was performed, which is shown in Figure 5, verifying that there is a Pearson coefficient [9] equal to 92.6%. This fact allows us to use the regression model in Figure 5 to convert historical TPP generation data into estimated PRT data, increasing the PRT generation data series.

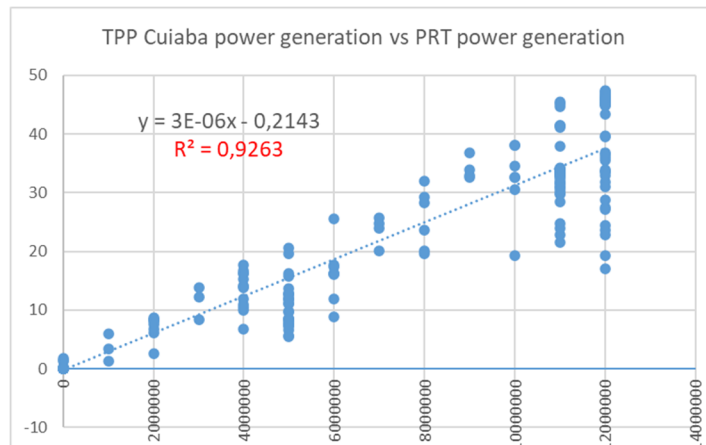


Figure 5: Linear correlation TPP Cuiaba power generation and PRT power generation

Figure 6 shows the historical times series of PTT Cuiabá's power generation between January 1, 2019, and August 31, 2022. Is possible to observe that there is a pattern in the curves, where it is verified that the National System Operator (O.N.S), unless rare exceptions, dispatches TPP Cuiabá in the last 5 months of the year. The year 2021 deviates from the typical behavior, but there was an atypical behavior of the electrical system in the period

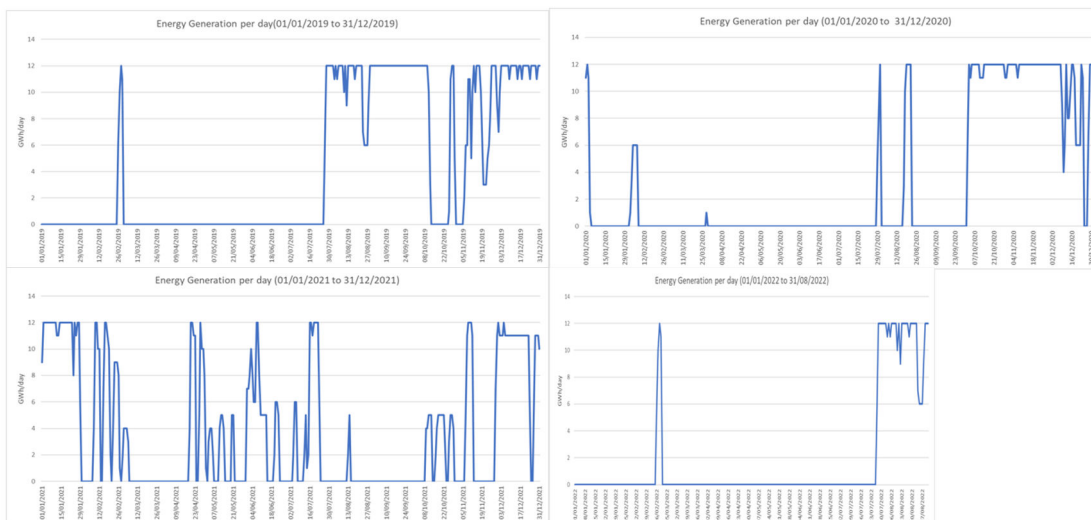


Figure 6: TPP power Generation between 2019 and 2022

The maximum daily generation capacity of TPP Cuiabá is close to 12 GWh/day, so when analyzing a complete histogram of 44 months in Figure 7, it is confirmed that most of the time the plant is either not dispatched by the O.N.S or dispatched with low generation level.

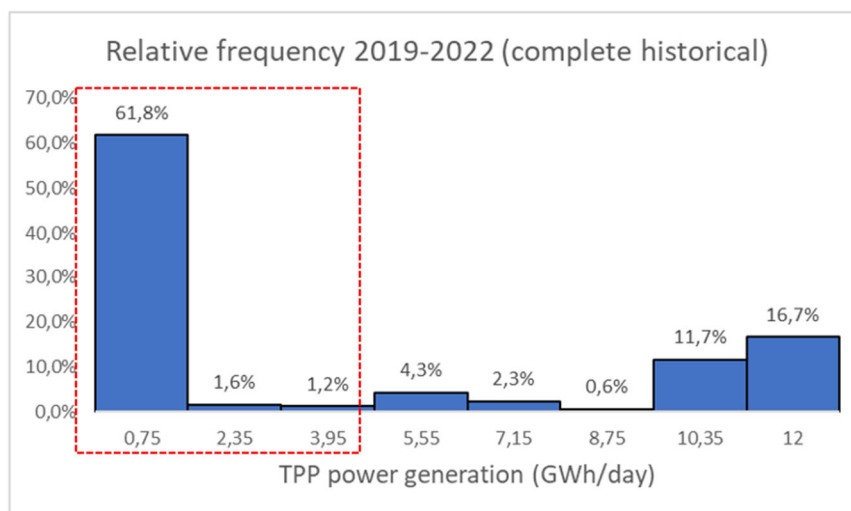


Figure 7: Relative frequency of TPP Cuiabá power generation considering complete historical between 2019 and 2022

On the other hand, if the analysis is restricted to the period that is usually dispatched (between August and December), it can be seen in Figure 8 that TPP Cuiabá generates high values, very close to its nominal capacity (12 GWh/day), in most days.

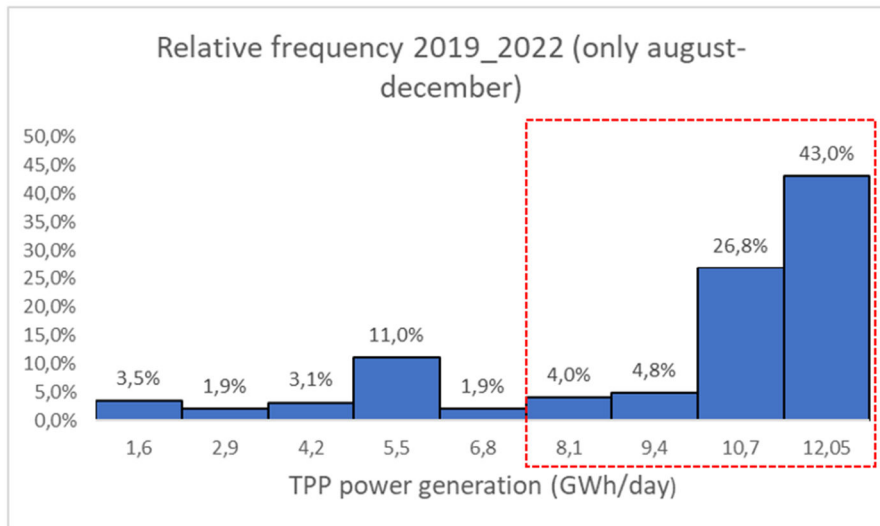


Figure 8: Relative frequency of TPP Cuiabá power generation considering only period August to December.

3.2 PRT Power Forecasting

To assess the financial viability of the investment, it is necessary to predict the amount of energy that the PRT will generate in the future. In this article, we use the following assumptions:

- (i) PRT can only generate energy when TPP is dispatched by O.N.S.
- (ii) The uncertainty in the behavior of the TPP generation time series is the same as for the PRT generation series.
- (iii) The TPP is historically dispatched in the last 05 months of each year (aug-dec), so the PRT will only generate in these periods.
- (iv) The mean and standard deviation used only consider historical data from the last 05 months of each year (aug-dec).
- (v) The PRT generation forecast was carried out over a 14-year horizon (2013-2026).
- (vi) For each day of the horizon, 10,000 possible PRT generation scenarios are drawn, using the uncertainties of the TPP historical series.
- (vii) It is assumed that the uncertainty of the PRT generation can be represented by a normal distribution probability.

As an example, Figure 9 shows a histogram of the PRT's energy generation forecast for September 28, 2023. A similar approach was carried out for all days of the analyzed horizon.

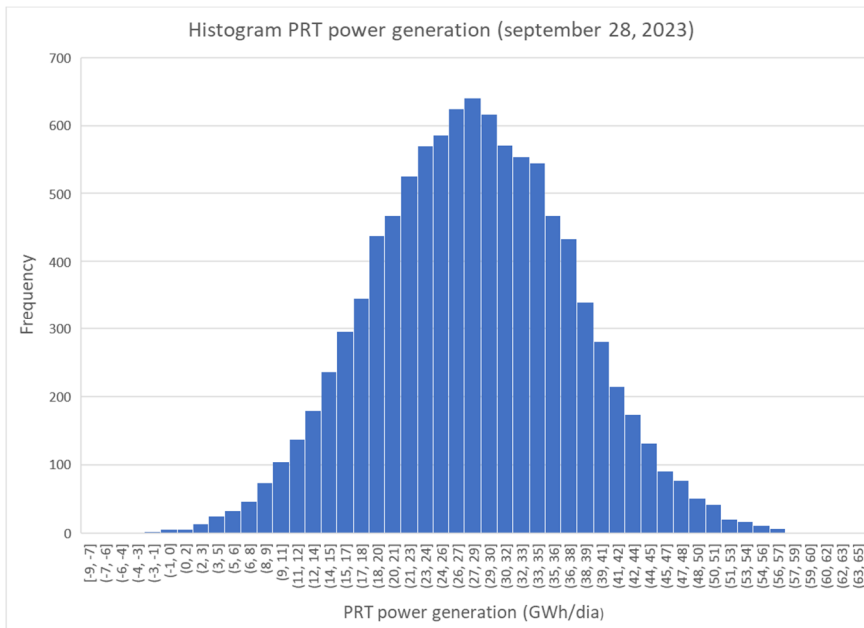


Figure 9: Relative frequency of TPP Cuiabá power generation considering only the period of August

3.3 Energy Price

One of the most important variables to carry out the economic-financial evaluation of a power generation project is the energy price. In this study, we will use the PLD, which is the Energy price short term used in Brazil. It is the price used to settle the difference between resources and requirements of each agent in the Brazilian Short-Term Energy Market. It is calculated similarly to the Marginal Cost of Operation (MCO), used to define which plants will be turned on and off, so that there is a balance between production cost and future security of energy storage.

Figure 10, shows the relative frequency of average short-term prices (PLD) in the Southeast/Midwest submarket, the region where TPP Cuiabá is located. Only the August-December periods from 2001 to August 2022 are considered in the analysis. It is observed that there is little frequency of high prices, although, in periods with low reservoir levels, PLD values have reached the maximum prices permitted by Brazilian regulation. As a reference, Brazilian Real (R\$) to US Dólar rate is about \$0,19.

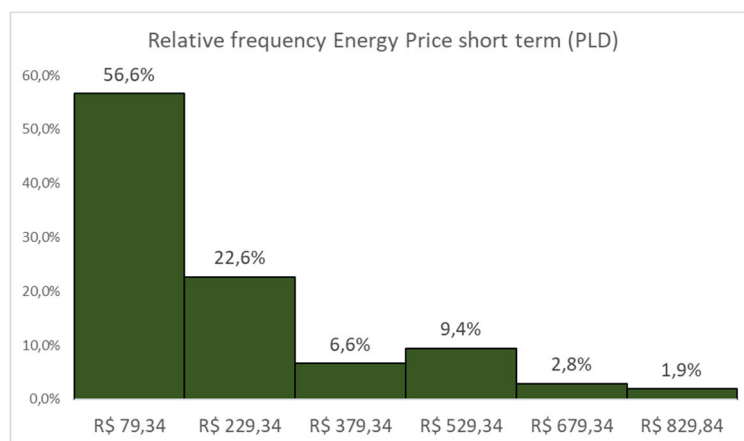


Figure 10: Relative frequency energy price (aug-dec) since 2001 to 2022.

3.4 Energy Price Forecasting

Making an Energy Price forecast is a great challenge since it is a variable that depends on a large amount of information, such as weather forecast, inflows, wind speed, load forecast, and reservoir level, among others.

In this study we considered the following criteria:

- (i) As defined by the CCEE (Camera de Comercialização de Energia Elétrica), the minimum value that the PLD can currently have is R\$55.70/MWh and the maximum value is R\$646.58/MWh;
- (ii) The standard deviation considering data since 2001 is R\$192/MWh;
- (iv) The arithmetic average considering data since 2001 is R\$197/MWh;
- (v) We assume that the PLD can be represented with a Normal Probability Distribution.
- (vi) The Energy Price forecast considers only the last 05 months of each year (Aug - Dec);
- (vii) 10,000 Energy Price scenarios were drawn for each month from August 2023 to December 2036.

The forecast is made for each month of the horizon that is intended to be addressed. Therefore, for each month, 10,000 price scenarios are drawn. As an example, in Figure 11, the simulation for the month of August 2023 is presented, where a low frequency of high prices and a high frequency of low prices are observed.

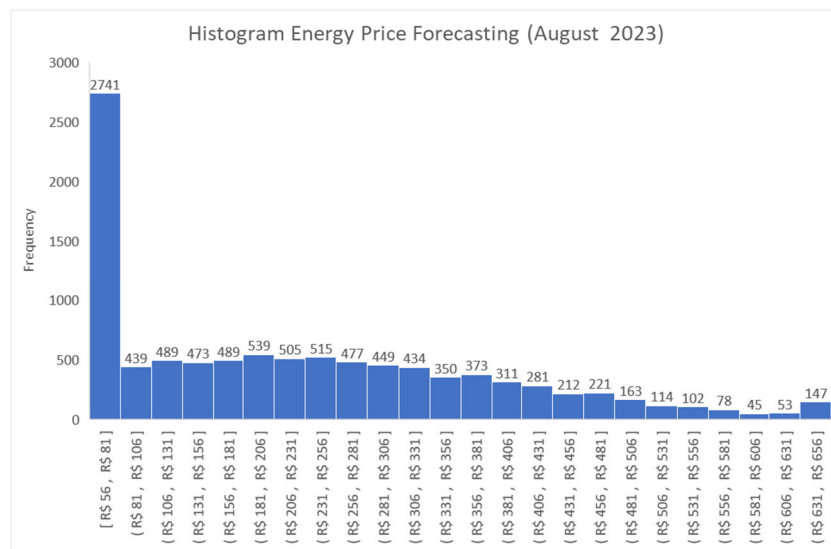


Figure 11: Histogram Energy Price Forecasting (August 2023).

3.5 Independent variables

It is important to ensure that the PRT energy price and energy generation are independent variables, so a linear correlation analysis was carried out between the historical short-term energy price (PLD) and the power generation of TPP Cuiabá. The result is presented in Figure 12 and shows that the Pearson coefficient [9] is low (0.0711), so we can say that there is no linear correlation between these variables.

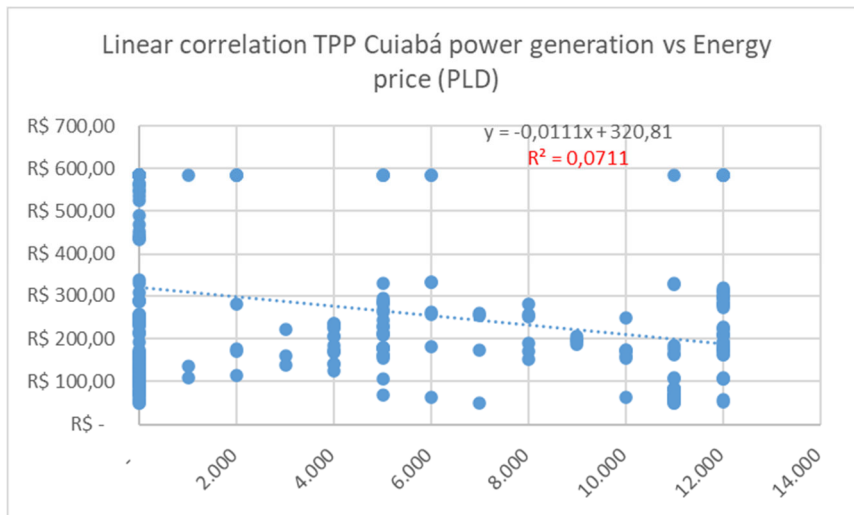


Figure 12: Linear correlation between TPP Cuiabá power generation and energy price

3.6 Deterministic data definition

Following is the definition of the deterministic variables used in this study:

Cost of capital – set at 10% annually.

CAPEX – The investment considered for the acquisition of a (PRT), was R\$ 10,832,500, which includes the nationalizing equipment costs, plus installation costs.

OPEX – 10% of estimated revenue.

Project life cycle – 20 years

3.7 Simple payback calculations

The first analysis performed was the simple payback calculation, for which 10,000 energy price scenarios were run (monthly), in addition to the 10,000 energy generation scenarios (daily), not including the cost of capital. All scenarios indicated that the payback period is 11 years, that is, the return of the investment will be in 2032.

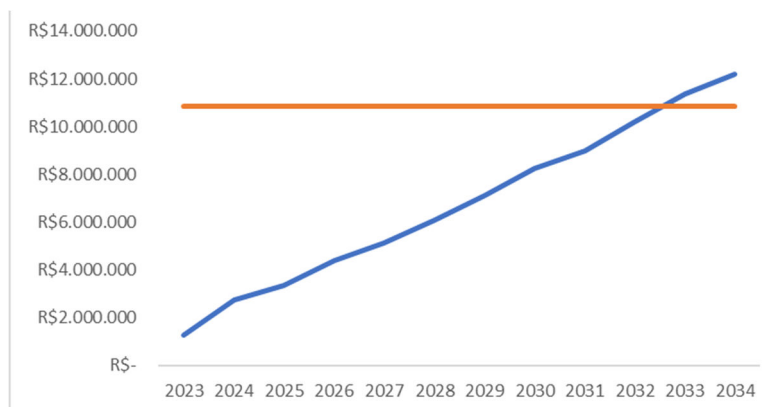


Figure 13: Simple payback outcome

3.8 NPV calculations

Figure 14 shows the NPV result for a 14-year horizon. 10,000 scenarios were considered for energy prices (on a monthly basis) and 10,000 scenarios for PRT generation (on a daily basis). A 10% annual cost of capital has been included. It is observed that there is a 5% risk of obtaining a negative NPV less than or equal to BRL 1,258.00 and a 2.5% risk of obtaining a negative NPV less than or equal to BRL 28,879.00. On the other hand, the probability of getting an NPV greater than or equal to R\$321,239 is 5% and the probability of obtaining an NPV greater than or equal to R\$348,698 is 2.5%.

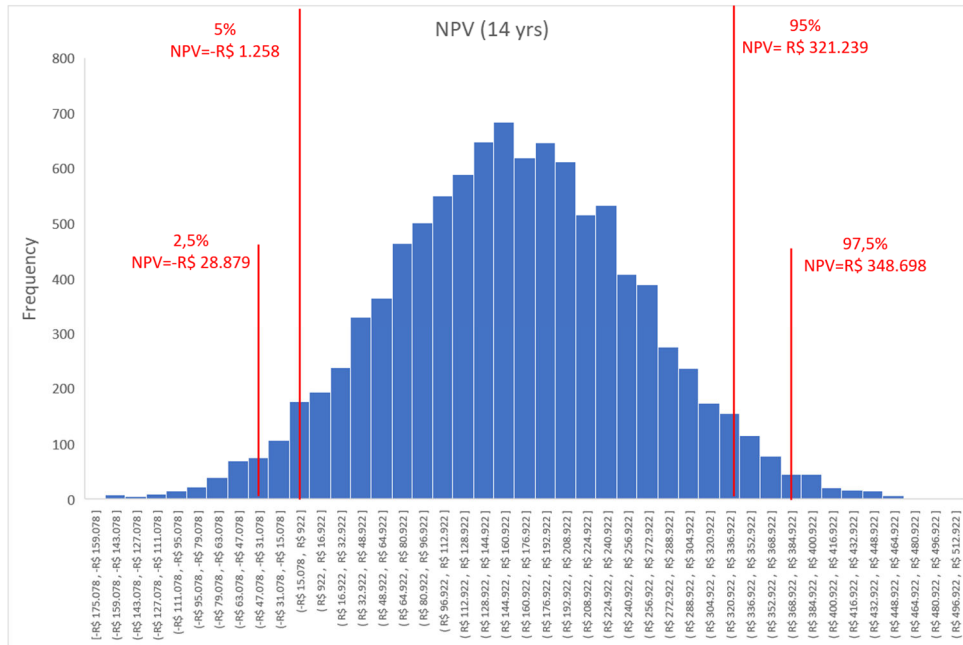


Figure 14: NPV outcome

3.9 Sensibility analysis

The approach proposed in this article easily allows performing sensitivity analyses, modifying relevant variables, and fixing the others. As an example, Figure 15 shows the NPV calculated for the same case analyzed in the previous section (see Figure 14), but changing the energy price in only 5 months (between August and December 2023), reaching an average value of BRL 600/MWh. This price level is not out of the question and happened in more than 6% of the historical values of energy prices analyzed since 2001. As a consequence of the price change in these months, there is no negative NPV value, increasing considerably the attractiveness of the project.

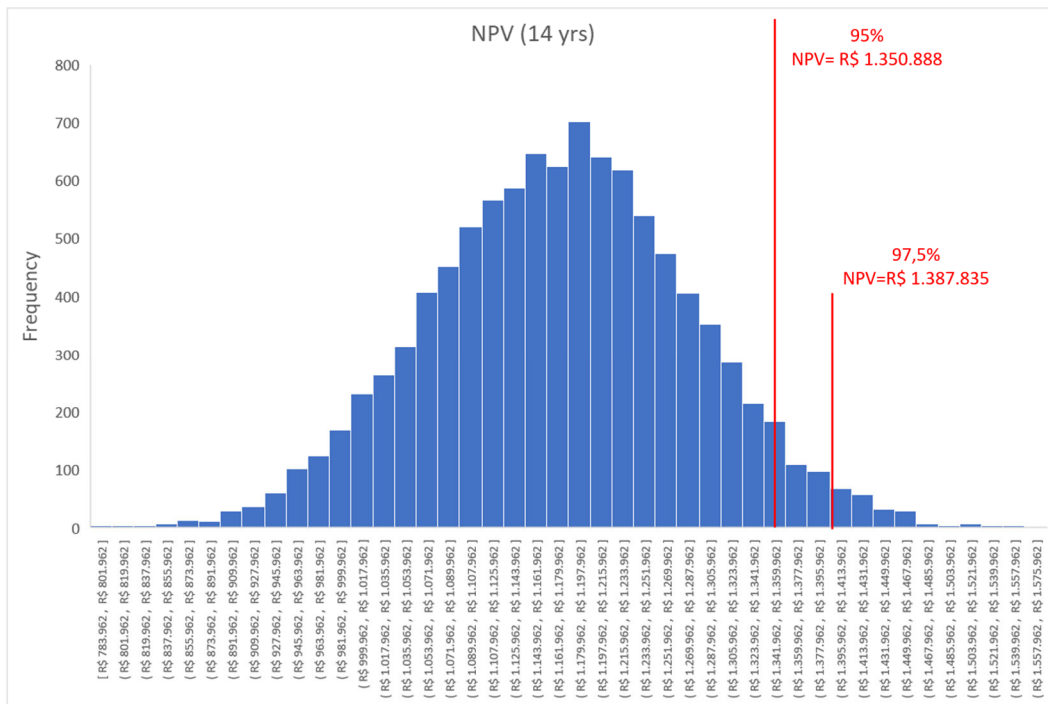


Figure 15: NPV outcome modifying energy price

4. Conclusions

The use of pressure reduction turbines is an interesting alternative for improving the energy efficiency of a gas-fired thermoelectric generation plant. In the Brazilian case, the potential of installing PRT is 66 MW of power, which could yearly avoid the emission of 235,800 tons of CO₂ and generate 333 GWh/year of electricity. As it is an unknown solution in Brazil, there is a lack of knowledge of the energy benefits (generation capacity of the PRT) and mainly of the financial viability of its adoption. The data used in this article comes from a pilot project to install a PRT in TPP Cuiabá, located in the state of Mato Grosso. Regarding the generation capacity, this article uses thermodynamic modeling of the pressure-reducing turbine, which allows estimating the generation capacity of a PRT. The result of this thermodynamic model is one of the fundamental inputs for conducting a feasibility analysis of a project with these characteristics. Besides the uncertainty of PRT generation, the economic and financial viability of this type of project must consider the high level of uncertainty present in variables such as the price of future energy and the periods in which the TPP will be called upon to generate by the system operator, a decision that depends (among other aspects) on the availability of water resources in the national interconnected system.

The methodology used in this article allows for a more comprehensive analysis of the feasibility of projects of this type by considering thousands of price and power generation scenarios, providing a quantification of investment risk by using the Montecarlo method.

5. Acknowledgments

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Indirect Determination of HTF Flow Rate in Loops of a Parabolic Trough CSP Plant through Computational Hydraulic Modeling

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Abstract— With the global demand for renewable energy and other clean energy sources, intending to reduce emissions that contribute to global warming, concentrated solar power has proved to be reliable with numerous projects in recent decades. The great advantage of this technology is its ability to store thermal energy and control its dispatch in electrical generation. Concentrated solar power plants, or CSP plants use, in general, a heat transfer fluid (HTF) to absorb the concentrated heat from the sun, which is later transferred to a boiler generating steam that feeds a turbogenerator, called the Rankine cycle. For CSP plants that use the technology of parabolic trough concentrators, the high temperatures necessary for the operation of the Rankine cycle are obtained by concentrating the sun's rays in a receiving tube existing at the focal point of the parabolic trough made of mirrors. This tube absorbs the thermal energy and transfers it to the HTF that flows inside it, forced by a pump. These concentrators are arranged in the solar field in a way that the main flow of HTF is divided by several parallel paths, called loops. A flow meter measures the total flow sent to the solar field, where a control system adjusts the flow rate to obtain the desired temperature at the solar field outlet. The control of the flow division in the solar field is carried out at the commissioning of the plant by manually adjusting the opening of existing valves at the inlet of each loop, where these are regulated in such a way that the temperatures at the outlets of the loops are equal. In theory, the flow rates obtained by this indirect method should be the same since the loops are exposed to the same thermal energy. However, when any loop presents some anomaly, such as geometric errors in the concentrators or inadequate solar tracking, these are not perceived by the indirect flow rate adjustment methodology, causing the problematic loop to have its flow adjusted below the others to achieve the desired outlet temperature. Thus, knowledge of the flow rate in each loop is an essential parameter for problem detection in the solar field, in addition to allowing an individual analysis of performance. On the other hand, the huge number of loops in a large plant makes it impossible to use flow measurements in each of them, being impractical from a financial point of view. This article presents a reliable and low-cost methodology that allows the determination of the flow rate in each loop by measuring its inlet and outlet pressures, for any flow adopted by the pump, using computational hydraulic modeling of the solar field that allows the knowledge of the load loss in strategic points of the system. This methodology will be tested at the Porto Primavera CSP plant, located in the state of São Paulo, Brazil. It's the first plant of its type in the country as a result of

investments in R&D with the Brazilian Electricity Regulatory Agency funding..

Keywords— Parabolic Trough, concentrated solar power, CSP, flow rate measurement, hydraulic model, renewable energy, energy efficiency.

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Development of a Test Plant for Parabolic Trough Solar Collectors Characterization

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Abstract— The search for increased efficiency in generation systems has been of great importance in recent years to reduce the impact of greenhouse gas emissions and global warming. For clean energy sources, such as the generation systems that use concentrated solar power technology, this efficiency improvement impacts a lower investment per kW, improving the project's viability. In the specific case of parabolic trough solar concentrators, their performance is strongly linked to their geometric precision of assembly and the individual efficiencies of their main components, such as parabolic mirrors and receiver tubes. Thus, for accurate efficiency analysis, it should be conducted empirically, looking for mounting and operating conditions like those observed in the field. The Brazilian power generation and distribution company Eletrobras Furnas, through the R&D program of the National Agency of Electrical Energy, has developed a plant for testing parabolic trough concentrators, located in Aparecida de Goiânia, in the state of Goiás, Brazil. The main objective of this test plant is the characterization of the prototype concentrator that is being developed by the company itself in partnership with Eudora Energia, seeking to optimize it to obtain the same or better efficiency than the concentrators of this type already known commercially. This test plant is a closed pipe system where a pump circulates a heat transfer fluid, also called HTF, in the concentrator that is being characterized. A flow meter and two temperature transmitters, installed at the inlet and outlet of the concentrator, record the parameters necessary to know the power absorbed by the system and then calculate its efficiency based on the direct solar irradiation available during the test period. After the HTF gains heat in the concentrator, it flows through heat exchangers that allow the acquired energy to be dissipated into the ambient. The goal is to keep the concentrator inlet temperature constant throughout the desired test period. The developed plant performs the tests in an autonomous way, where the operator must enter the HTF flow rate in the control system, the desired concentrator inlet temperature, and the test time. This paper presents the methodology employed for design and operation, as well as the instrumentation needed for the development of a parabolic trough test plant, being a guideline for standardization facilities.

Keywords— Parabolic Trough, concentrated solar power, CSP, solar power, test plant, energy efficiency, performance characterization, renewable energy.

I. INTRODUCTION

The reduction of greenhouse gas emissions per kWh through the efficiency of the generation processes has been of great importance nowadays, with emphasis on the different existing methodologies focused on waste heat recovery [1]. Thus, an efficient generation system can generate a greater amount of

energy per kg of carbon dioxide gas emitted.

In the specific case of solar systems where there are no direct emissions in the generation process, the efficiency reflects in smaller systems, and consequently, less indirect emissions from the manufacturing processes. In addition, more efficient systems require less land for their installation, which is a factor of great impact in a future where the generation by renewable sources to reduce carbon dioxide emissions should increase significantly, as well as the impact caused by the demand for land to the installation of these systems [2].

For the solar concentration systems that use the parabolic trough technology, even though the individual efficiency of its main components is known and is available by their manufacturers, for example, the efficiency of receiver tubes and parabolic mirrors, the final efficiency of this equipment is directly related to their manufacturing precision and field assembly and should be obtained empirically.

Currently, in Brazil, there are efforts through the National Agency of Electrical Energy - ANEEL for the implementation and development of new technologies to diversify the country's energy matrix, heavily dependent on the hydraulic source, which in 2020 was responsible for 64% of its generation [3]. These incentives come through research and development programs - R&D, where there is an effort for the first concentrated solar power plants to be implemented to bring this technology closer to the country, as an example of Porto Primavera 500 kW concentrated solar power plant, commissioned at the end of 2021 in state of São Paulo and built with resources from these R&D programs.

Given this favorable scenario for the development of concentrated solar power technology in Brazil, the generation and distribution company Eletrobras Furnas, in partnership with Eudora Energia, began in 2020 an R&D project to develop a parabolic trough collector with a metallic structure and a tracker using as maximum as possible Brazilian components. The intention is to make this technology economically viable for future commercial projects.

The development of this Brazilian collector brought with it the demand for efficiency tests since the use of indirect methods for this type of structure can be completely inaccurate, as already discussed in previous paragraphs. Thus, still within the scope of the R&D for the development of the parabolic trough collector, it was necessary to develop a test plant for its

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characterization since the knowledge of its efficiency is of extreme importance for the financial analysis of future enterprises.

This paper presents the methodology used in the design and operation of this test plant, as well as the control logical and constructive details, where the objective is to serve as a reference for the elaboration of new test plants with a similar purpose.

II. METHODOLOGY

The following steps were used in the conception, design, and construction of the Brazilian parabolic trough collector characterization plant, and will be presented in the following sections of this article:

Step I – Bibliographic survey and selection of the international reference standard.

Step II – Elaboration of the plant's operation description and flow chart.

Step III – SCADA control software/interface development.

Step IV – Design and construction of the plant.

III. PLANNING AND BUILDING THE TEST PLANT

A. Bibliographic Survey

Before the conception and design of the test plant, it was carried out a research on the existing characterization methods used for parabolic trough collectors, as well as on the available international standards. Within the methodologies found in the literature, there is a very clear separation between two main types: optical characterization and thermal characterization.

1) Optical Characterization

The optical characterization evaluates imperfections in the structure that cause the direct solar rays not to be correctly directed onto the receiver tube positioned at the focus of the parabolic shape. Thus, geometric errors are easily detected by this type of characterization, which allows, for example, the identification of which specific mirrors of a collector do not effectively direct the solar rays. Despite having the great advantage of identifying geometric errors and imperfections, this type of characterization does not show the effective efficiency of the collector, that is, how much of the solar power is available and is being transferred to the working fluid circulating inside the receiver tube, and much of the optical methodology found in the literature is quite experimental and relatively complex. Within this characterization class, the prominent methodologies are the following:

- Laser Scanning [4];
- VSHOT method [5];
- Photogrammetry [6];
- Distant Observer Method [7];
- Deflectometry [8];
- Topcat method [9];
- Tarmes method [10];
- VISField method [11];
- 3D Laser Scanning [12].

2) Thermal Characterization

This class of characterization evaluates the collector's capacity to transfer heat to the working fluid that circulates inside the receiver tube for the specific case of parabolic trough collectors. Thus, although it is not possible to detect geometric imperfections directly, the thermal characterization allows quantifying the effective efficiency of the collector empirically, and the geometric imperfections are perceived indirectly by reducing the efficiency of the same. Another great advantage of this type of characterization is the possibility of normative tests. The main standards used for this type of test in solar collectors are as follows:

- ISO 9806:2017 – Solar energy – Solar thermal collectors – Test methods
- ASTM E905-87:2013 – Standard Test Method for Determining Thermal Performance of Tracking Concentrating Solar Collectors

In addition to the standards, the studies of Fernández-García et al. [13] e Valenzuela et al. [14] have also been consulted. They address the thermal characterization of parabolic trough collectors.

B. Selecting the International Reference Standard

Both standards have wide acceptance in the market, however, the ASTM E905-87 standard, despite being specific for concentrators with tracking, has a lower degree of detail compared to the ISO 9806:2017 standard. In addition, it requires test conditions with normal incidence achievable only a few times a year and in certain locations in Brazil (when a rotating platform is not used together with the tracking), making its application difficult for large concentrators. Thus, the ISO 9806:2017 standard was selected as a reference for the design of the test plant for parabolic trough collectors.

C. Plant Operation Description and Flowchart

The test plant for the Brazilian parabolic trough collector was designed to meet the quasi-dynamic state established in ISO 9806:2017. Table I presents the variables monitored in the tests. The working fluid selected for the plant was the HTF (Heat Transfer Fluid) Dowtherm A due to the temperatures that the collector will be subjected to, close to 400°C.

The simplified flowchart of the plant is shown in Fig.1. It works as follows:

The HTF contained in the expansion tank is pumped through the parabolic trough, passing into the receiving tube of the first prototype under test (SCE1) and then through the second prototype under test (SCE2), where the flow rate and inlet and outlet temperatures are monitored and acquired every 5 seconds. The heat supplied to the HTF should be dissipated from the system to ensure the same return temperature to the collector during the test, meeting the variations allowed by ISO 9806:2017 for the quasi-dynamic state (variation of $\pm 1^\circ\text{C}$ from the temperature selected for the test).

TABLE I
MONITORED PARAMETERS IN THE TESTS

Parameters	ISO 9806:2017 (quasi-dynamic)
Solar concentration area	✓
Fluid heat capacity	✓
Global Solar Irradiance	--
Global solar irradiance at the concentrator plane	✓
Diffuse solar irradiance at the concentrator plane	✓ ^a
Direct Normal Irradiance	✓
Angle of incidence of direct solar irradiation (can be calculated)	✓
Wind speed and direction	✓ ^b
Thermal fluid temperature at the collector inlet and outlet	✓
Thermal fluid flow rate	✓
Tracker rotation angle	✓
Azimuth and tilt angle of the collector (relative to the horizon)	✓
Geographic location (latitude and longitude)	✓

^a An apparatus should be used next to the hemispherical irradiance sensor to measure the diffuse irradiance, such as a shading ring or ball.

^b The standard mentions that the dependence on wind speed can be neglected for evacuated tube collectors.

Heat dissipation requires the use of heat exchangers. For the specific case of this plant, where the objective is to perform tests both at temperatures close to ambient and at higher temperatures, compatible with its application in concentrated solar power generation plants, two air/liquid type heat exchangers (or air coolers) were selected. The first of them was designed to dissipate heat at low-temperature tests (10°C above ambient temperature) and has a large amount of heat exchange area, however, its construction, which uses aluminum fins for heat dissipation, has an operational limitation of up to 100°C. For temperatures above this, a second heat exchanger was designed where a non-finned steel tube coil performs the heat exchange with the air. In both cases, it is possible to use forced air ventilation to increase heat exchange. These heat exchangers are shown on the right of the flowchart in Fig. 1.

The test plant must enable thermal characterization over a wide temperature range, so in addition to the heat exchangers, a set of two control valves perform the necessary flow adjustment and by-pass of the heat exchangers, so that the temperature of the HTF at the inlet of the expansion tank is always reached. Thus, when the exchanger outlet temperature is below the desired one, the by-pass line control valve starts to open, while the valve at the exchanger inlet is closed in a complementary way, this allows that part of the hot HTF does not pass through the heat exchanger, joining the cold HTF further in the same line, obtaining at the end an intermediate temperature at the expansion tank inlet.

Inside the HTF expansion tank, an electrical resistance has been implemented to perform the following functions:

1st function: to ensure a fine adjustment of HTF temperature at the expansion tank's outlet. Thus, if the heat exchanger reduces too much this temperature, the electric resistance guarantees the necessary gain to keep the return temperature to the collector stable during the test.

2nd function: to raise the temperature of the system to the temperature selected for the test, working as an additional heat source to the parabolic trough collector, to reduce the time required to heat the entire HTF volume of the plant (approximately 700 liters at 25°C).

Due to the properties of the working fluid selected for this plant (HTF Dowtherm A), the expansion tank needs to be inerted and pressurized with nitrogen. This pressure ensures that the HTF is kept in a liquid state even during high-temperature testing.

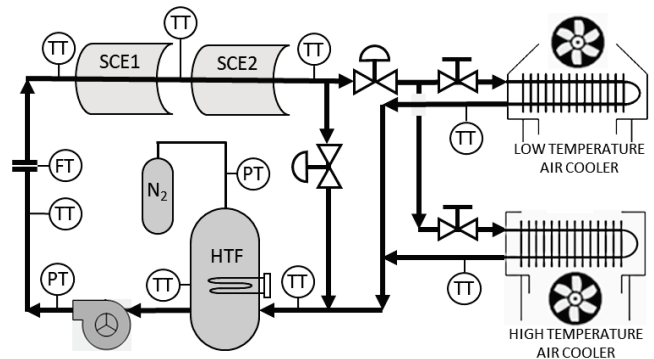


Fig. 1 Simplified flowchart of the test plant

D. Plant SCADA System Description

The SCADA (Supervisory Control and Data Acquisition) system of the test plant was designed to have a friendly and intuitive interface, where the operator can previously define the main parameters of the tests presented in TABLE II simply and directly.

TABLE II
CONFIGURABLE VARIABLES IN THE PLANT CONTROL SYSTEM

Variables	Range
Inlet temperature at the collector	40°C to 390°C
HTF flow rate	0,5 kg/s to 3 kg/s
Inlet temperature of the HTF in the tank	40°C to 390°C
Temperature of the HTF in the tank	40°C to 390°C
Stabilization time	No limits
Test time	No limits

After the operator defines the test input data and clicks on the "start test" button, the plant enters the "waiting" mode until the parameters for starting the test are automatically reached. For example, if the operator has selected the test temperature of 100°C (inlet temperature at the collector) and the plant is below this temperature, the system recirculates the HTF passing through the collector, however, performing the heat exchanger by-pass, until the set temperature is reached. The use of the electric resistance for this heating up to the test setpoint is optional and can be enabled or disabled at any time. After reaching the set temperature for the test, the plant enters the "stabilization" mode, where a previously set timer is activated, so that the plant has enough time to make the necessary adjustments to keep the inlet temperature and the HTF flow rate in the collector as constant as possible. Within this stabilization

time, the plant adjusts the control valve openings to dissipate the necessary energy in the heat exchangers to obtain the HTF temperature in the inlet at the expansion tank as close as possible to the temperature set by the operator. In addition, at the same time, the system also makes the necessary adjustments to the electrical resistance's power to keep the HTF outlet temperature from the tank stable. Thus, the goal is to minimize the occurrence of temperature and flow rate fluctuations during the test period.

After the stabilization time is completed, the plant enters the "test" mode, where data is acquired every 5 seconds for a period defined by the operator. The ISO 9806:2017 standard recommends that this period be at least 5 minutes. Throughout the test period, the plant control system works to keep the collector inlet parameters stable (temperature and flow rate) to meet the quasi-dynamic state defined in the ISO standard. The collector's output temperature is not controlled and depends directly on the direct solar irradiation available at the period of the test and the selected flow rate.

Based on the HTF temperature variation in the collector, the available DNI, the incidence angle, the flow rate, the collector area, and the enthalpy properties of the fluid (or specific heat), the plant control system calculates and presents the instantaneous thermal power of the collector and the apparent efficiency of the system, called "apparent" because it does not reflect the real efficiency, once it uses instantaneous data in the calculation, used only as a reference during the tests for possible adjustments, for example in the solar tracking system.

After the end of the testing time, an Excel file is automatically generated with all the data acquired from the plant and the control system goes back into the waiting mode, keeping the collector's input parameters as constant as possible according to the last setpoint. The plant can perform a new test at any time after the operator clicks "start test" on the control screen. If a new input parameter is entered, the control system will reach it again autonomously and start the stabilization time and a new test. The main screen of the SCADA system can be seen in Fig. 2.

E. Construction of the Plant

After the conception of the plant operation, the projects for its construction were designed. In Fig. 3 it is possible to see the heat exchangers and in Fig. 4 the control valves of these heat exchangers. Figs. 5 and 6 show images of the test plant already with the parabolic trough collector installed.

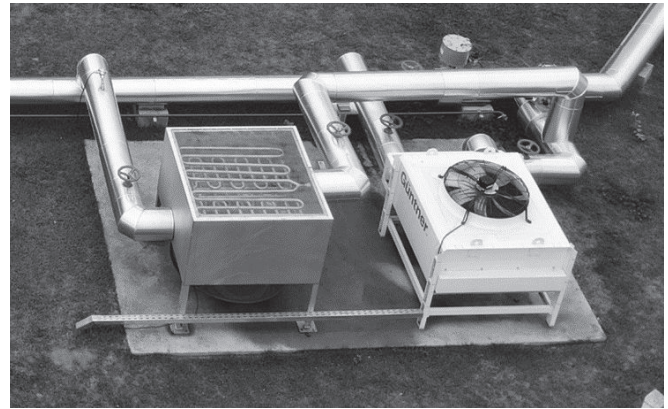


Fig. 3 Test plant heat exchangers

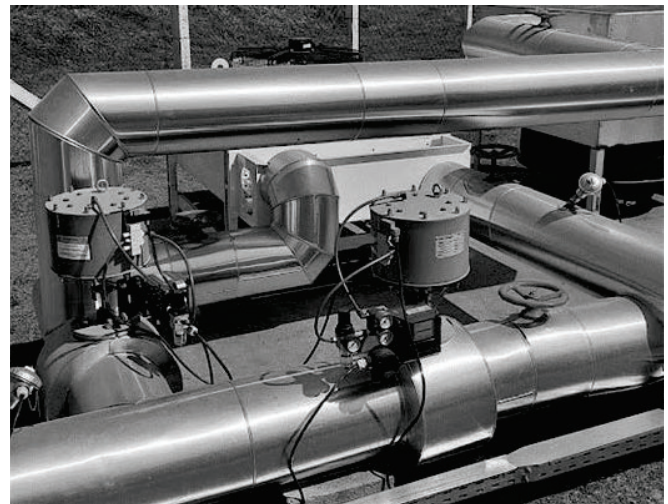


Fig. 4 Detail of the heat exchanger control valves

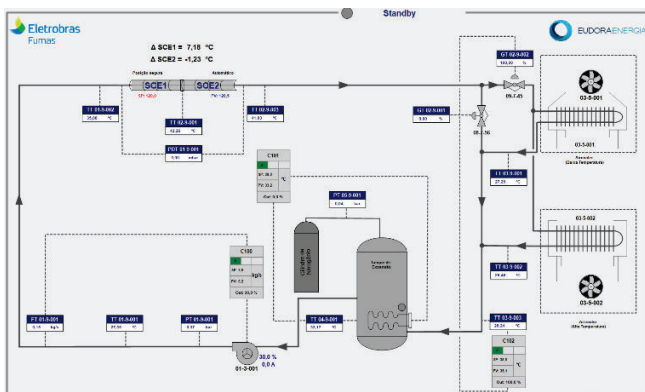


Fig. 2 SCADA system main screen

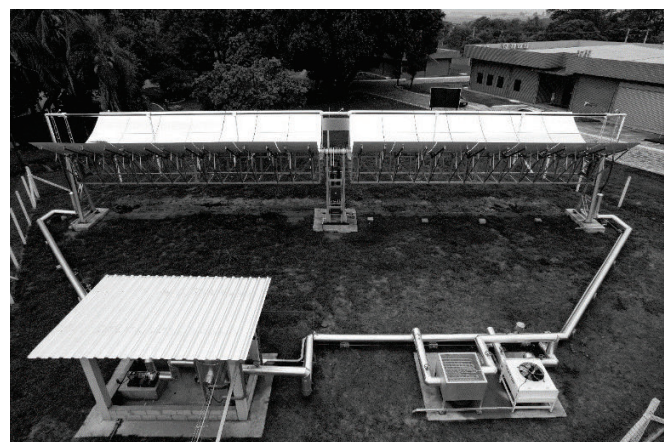


Fig. 5 Test plant seen from the ground

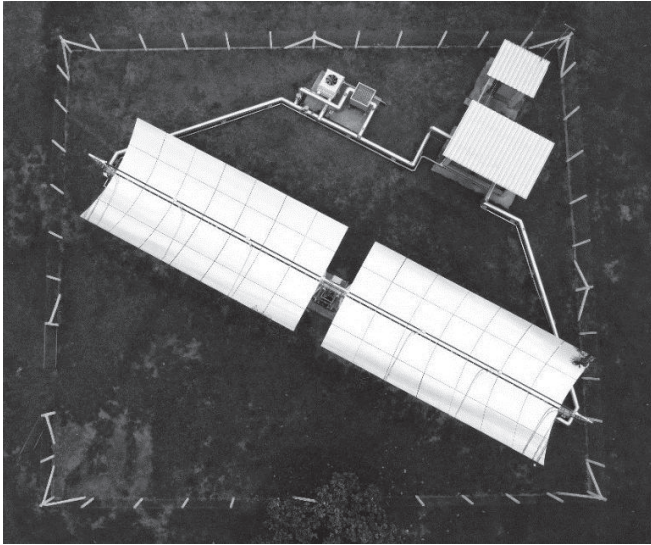


Fig. 6 Test plant aerial view

IV. CONCLUSION

This article presented details of the design and operation of the test plant for parabolic trough collectors built in Brazil by the Eletrobras Furnas company, in partnership with Eudora Energia, for the characterization of the national collector under development. This is the first installation for testing collectors of this type in the country.

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Deep-Learning to Generation of Weights for Image Captioning Using Part-of-Speech Approach

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Abstract—Generating automatic image descriptions through natural language is a challenging task. Image captioning is a task that consistently describes an image by combining computer vision and natural language processing techniques. To accomplish this task, cutting-edge models use encoder-decoder structures. Thus, Convolutional Neural Networks (CNN) are used to extract the characteristics of the images and Recurrent Neural Networks (RNN) to generate the descriptive sentences of the images. However, cutting-edge approaches still suffer from problems of generating incorrect captions, accumulating errors in the decoders. To solve this problem, we propose a model based on the encoder-decoder structure, introducing a module that generates the weights according to the importance of the word to form the sentence, using the part-of-speech (PoS). Thus, the results demonstrate that our model surpasses state-of-the-art models.

Keywords—Gated Recurrent Units, Caption Generation, Convolutional Neural Network, Part-of-Speech.

I. INTRODUCTION

IMAGE captioning is a multimodal task that focuses in encoding and decoding an input image, generating descriptive phrases. With the exponential increase in deep learning techniques, image captioning it has been an important topic for the computer vision and natural language processing communities. Several works in the literature use neural structures based on the encoder-decoder architecture to accomplish these tasks [1], [2].

In this sense, the encoder has the role of extracting the characteristics of the input images, transforming this information into a fixed-length vector through the Convolutional Neural Network (CNN) while the decoder generates the sentences through Recurrent Neural Networks (RNN) [3].

Despite obtaining good results, the image captioning models still face some problems. Among them, the lack of context information, the deviation of content from the images stands out [4], and generation of non-cohesive sentences for the images [5]. To solve these problems, to explore the visual attention or semantics of images can improve understanding the context of the scenes of the images. Furthermore, models capable of enriching semantic representations can also be an alternative to these problems [6].

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Furthermore, introduce decoders using dual CNN can enhance the catching ability the long-term dependencies [5]. Therefore, this approach consists of use the attention of image regions and a word generator through CNN, capturing relationships between the sentences of a paragraph. Thus, the approach is capable of to produce semantically cohesive paragraphs for images, higher to other cutting-edge approaches, solved possible problems caused by RNN based decoders.

Consequently, Kishore et al. [7] proposed an based model on encoder-decoder using the Long Short-Term Memory (LSTM) for the generation of labels and automatic image descriptions, considering the probability of the words during the captioning process of the input image.

Based on this same structure, He et al. [1] introduced a new model called Visual-Densely Semantic Attention Network, sharing convolutional layers, using the LSTM to perform the subdivision of semantic attributes while the CNN performs the extraction of the image features, joining the semantic and visual information.

Despite, current approaches that use global features are not able to describe and represent all the important elements in complex scenes of the images. To mitigate this barrier, we can incorporate semantic elements, enriching these representations and update the language model [6]. This approach considers that the important captions of the images are centered on objects able to share simple structures and distinct through of the application of LSTM, predicting important regions in an image, generating local descriptions for these regions.

TO Consider the importance of the word for the image description is another important factor for the understanding of scenes in images. In this sense, Zhang et al. [8] introduced the Part-of-Speech (PoS) in the encoder-decoder structures, using networks of grammatical predictions, modeling and analyzing the grammatical classes of each word, integrating information from grammatical classes with image captioning models. Despite the significant results, of this approach still faces problems with the model and grammar analysis generating few descriptive captions.

Furthermore, some of these models still suffer from generations of little descriptive captions, accumulating errors in the neural decoder. To solve this problem, we propose an image captioning model based on the encoder-decoder structure. The difference of our model in relation to the others is that we have introduced a weights generation module based on the importance of each word to form the sentence of the images during neural network training.

For this, we use the PoS extracting and classifying each word of the training set, inferring different weights for each

word according to its class. In this way, words with greater importance for the understanding of the image obtain greater weights. In decoding, our model adopts the Gated Recurrent Units (GRU) receiving the weights resulting from the training weight generation module. Thus, our results indicate that our model exceeds the scores obtained by the cutting-edge models.

This paper is organized as follows: in section II presents the related Works on approaches that use similar architectures; in section III we present our approach; in section IV presents the details of the experiments and our results; in section V summarizes the conclusions.

II. RELATED WORK

The image captioning models have been reaching good results [4]. Therefore, image captioning is a complex task, demanding and considerable effort, not only from object recognition and its attributes, but also of semantic relations in between the entities [9]. To deal with this complexity in image captioning tasks, structures are applied capable to perform encoding and decoding of sentences and images.

One of main strategy of the encoder-decoder architecture that use deep neural networks is linked to generation of a sequence of sentences related to a set of images [10]. To perform this task, can be used neural structures based on architectures CNN and RNN. This pair of neural architecture acts well in tasks that perform classification and training of descriptive sentences on the target images, realizing the combination between the labeling and automatic descriptions generated by the models [7].

In this regard, the CNN have the role of extract features from images, generating fixed length vectors while the RNN generate image descriptions based on features extracted by the encoder, being capable at the same time, incorporate attention mechanisms both semantic and visual.

Therefore, Zarir et al. [11], proposed an encoder-decoder architecture inspired by language translation models based on RNN. This model used recurrent networks for decoding and CNN for encoding. This junction between CNN and RNN became more suitable for captions generation. Thus, models that take this approach receive an input image, producing an sequence of descriptive sentences from the image [11].

However, some of these models face problems for not being capable to generalize efficiently the training data. Thus, propose models capable to reduce the variation factor can auxiliary in generating the best sentences from the images, applying ensemble learning techniques, solving such problems [10].

Another possible solution is the performing the merge of the textual attention mechanism and the image sentence generation module, forming an end-to-end structure, increasing further the integrity of image information [4].

Recent works in literature apply semantic concepts, generating contextual information, supporting in understanding of the image scene. But the current approaches image captioning handle that task, specifically the extraction of local features, as a bag-of-visual-words. This bag-of-visual-words is not capable to capture the structures of objects incorporated by the

images. Thus, apply structures of image captioning capable to learn and interact with local concepts, introducing semantic correspondence schemes, can be obtained significantly better results in relation to current cutting-edge techniques [12].

Although same with good results, these architectures still suffer from the lack of information and the deviation of the content of the from images. Thus, explore visual attention to improve understanding about the image, incorporating labels through application of fully connected networks can be a possible solution for these problems [4]. In this sense, for the realization of image description efficiently it is necessary to extract as much information contained in a scene. In addition to detecting objects, information is vital for incorporating the models, improving efficiently the system of caption generation [13].

Another important task that can auxiliary in these incorporations, are the struct applications based on deep neural networks to perform the visual recognition of these relationships, possessing the intention of identify all objects contained in a scene, correlating their relationships [14], [13]. To perform this task, the model faces some problems, i.e., the scalability of class numbers related to objects. Such a problem cause a combinatorial explosion, making it difficult the redundant modeling of your exits. To solve these problems, the models use triple units aligned to RNN [14].

Introduce a semantic constructor from the image captions on the conventional CNN-LSTM model, rebuilding the semantic representations of input images, checking their similarities using the decoder can solve possible problems during the caption generations [3]. Thus, this module has a role of evaluate faithfulness of the caption prediction, generating a probability of the refinement the training model. Therefore, through insertion of this module the model is capable of perform semantic image transfer to the decoder, generating best captions when compared to other models.

But, the traditional approaches supported by the application of global CNNs do not represent and do not describe all the important elements in complex scenes [6]. Thus, models that enrich the semantic representations of images, updating the language model, incorporating semantic elements can solve these problems. In this sense, used of object detection modules for prevision the regions in the images through LSTM, can generate most significant local descriptions [6].

In addition to applying these approaches, perform the coupling stages predicting attributes and the extracting representations from images, can decrease the complexity of image captioning systems. Based on this idea, He et al. [1] proposed a new structure called Visual-Densely Semantic Attention Network (VD-SAN). This approach uses shared convolutional layers, divided into two parts: the predictions of semantic attributes; and the extraction of features from the images, applying LSTM [1].

Although the LSTM is popular in modeling natural language through generating descriptive phrases from objects, these structures have significant complexity to implement them [9]. Thus, the GRU have become efficient resources for generating sentences, having a important role for decoding processes from the image captioning for its simplicity of implementation [15].

Nonetheless, despite the success in use of encoder-decoder based structures for descriptive generation of images, these models still suffer with incorrect information in the image captioning process, accumulating errors during performing these tasks. To solve this problem, we propose to consider the importance of each word for phrase formation. In this sense, the model may be capable to generate sentences even more descriptive, considering higher weights for words that best describe the scenes of the images.

III. PROPOSED METHODOLOGY

We propose a model based on encoder-decoder architecture, using CNN for extract features from images and Multimodal GRU for perform image transcriptions (Figure 1).

In addition to adopting the CNN-GRU structure, our model introduces a weight generation module through the part-of-speech analysis. Thus, the model is capable of generate different weights in the training set according the word relevance for phrase formation. These weights are the base for decoder training.

A. Decoder-Encoder Architecture

We adopt as encoder the deep neural network VGG19 (Figure 2). The VGG19 architecture is one of the most used convolutional models to perform extracting the features of the images, having as an advantage its simplicity and practicality, obtaining significant performance in image captioning tasks [16].

In this model, VGG 19 has nineteen deep layers, using filters 3×3 for detailed capture of image features, containing five convolution layer stages, five layer pool and three fully connected layers. The VGG19 has input from 224×224 with the last layer as a classifier, using regression through softmax function, classifying the input images by probability.

We adopted the GRU as a decoder for generation of image sentences. Thus, the GRU has connection units capable to modulate information, without necessarily performing the separation of the memory cells using the update (z_t) and redefinition (r_t) gates. Therefore, we define the GRU by the following equations:

$$z_t = \sigma(X_t W_z + U_z h_{t-1} + b_z) \quad (1)$$

$$r_t = \sigma(X_t W_r + U_r h_{t-1} + b_r) \quad (2)$$

$$\tilde{h}_t = \varphi[X_t W_h + (R_t \odot h_{t-1}) U_h + b_h] \quad (3)$$

$$h_t = (1 - Z_t) \odot h_{t-1} + Z_t \odot \tilde{h}_t \quad (4)$$

where w and u are the weights resulting of scores representative of x_t and x_{t-1} , respectively.

B. Weight Generation Through Part-of-Speech

For weights generation that has an important role for decoder training, we adopt the part-of-speech (PoS). This technique becomes important because regard the importance of the word for the formation of image descriptions. Therefore, some of the arguments that a word decoder use only needed in a few steps, not needing persist this information throughout the captioning process.

Considering this factor and motivated by the proposed Deshpande et al. [17], where they applied the PoS analysis in generating significant image sentences, We propose in this work an approach where we calculate the word weights before the recurrent network training.

In this sense, the PoS tags can be defined as being one syntactic set of PoS word classes. In this case, the analyzer selects a subset of tags (θ), searching for the PoS of w_{n-1} in this subset (θ), if find, the language commutator is activated.

For example, suppose there is a set of phrases defined by $S(I) = \{w_0, w_1, w_2, \dots, w_{n-1}\}$, where w be the image labeled word I , w_0 will be the initial word, w_{n-1} the final stop of sequence of labels and n is the sentence size for I . At the instant of n , the probability of the word is analyzed by input the image sentence and by the labels generated in the set $S(I)$. Thus, considering the frequency of a determinate word into of an input sentence, the weight of that word can be calculated as follows:

$$P(S_n) = \frac{c(w_n)}{N_{token}(S)} \quad (5)$$

where $c(w_n)$ is the number of times the word w_n show in the sentence and $N_{token}(S)$ represents the total number of words the input sentence token S .

However, even considering the frequency of a determinate word in a sentence, is reasonable to predict that different words do not have the same relevance for the understanding or for the formation of a determinate phrase.

Thus, it is noticed that verbs, nouns, and conjunctions have higher weights when compared the other word classes. Therefore, we consider the importance of the word for the image description, attribute higher weights for the most important set of words. The Table I show the weights adopted by this model for different classes of words.

TABLE I
WEIGHT GENERATION THROUGH PART-OF-SPEECH

Tag	Class	W_{weight}
NOUM	Noun	1.10
VERB	Verb	1.05
ADJ	Adjective	0.90
ADV	Adverb	0.90
SCONJ	Subordinating Conjunction	0.80
INTJ	Interjection	0.80
DET	Determinant	0.80
CCONJ	Coordinating Conjunction	0.80
CONJ	Conjunction	0.80
AUX	Auxiliary verb	0.80
PREP	Preposition	0.80

Simply, the weights for different classes are given as follows:

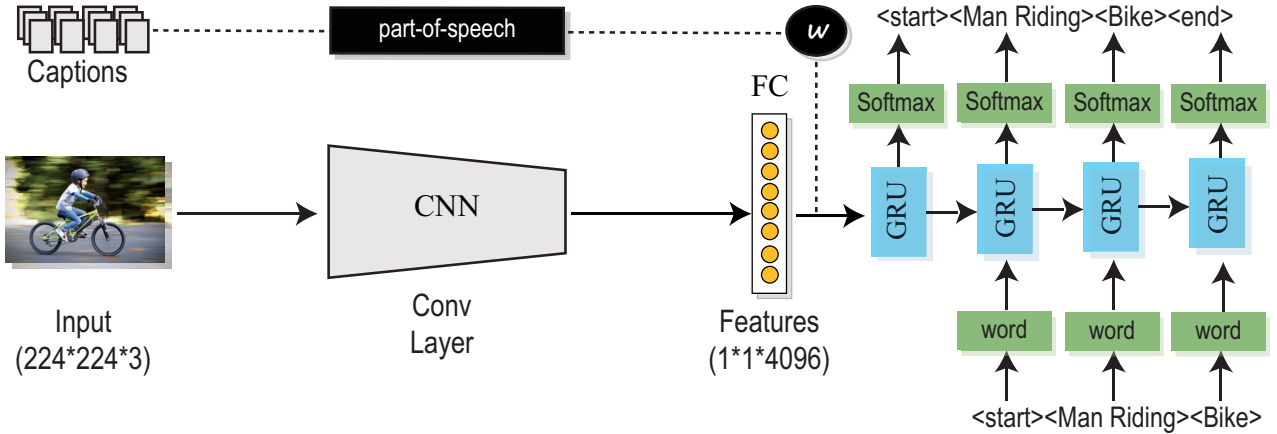


Fig. 1. General outline of the proposed model. Our model receives an input image and generates the appropriate sentence. We introduced a module for generating weights through part-of-speech. The multimodal GRU is trained with the weights generated by the weight generation module

VGG 19		
Layer	Input	Filters
input	224x224	3
2 conv	244x244	64
maxpool	112x112	128
2 conv	112x112	128
maxpool	56x56	256
4 conv	56x56	256
maxpoll	28x28	512
4 conv	28x28	512
maxpool	14x14	512
4 conv	14x14	512
maxpool	7x7	512
2 fc	1x1	4096
1 fc	1x1	1000
softmax	classifier	
Encoder		

Fig. 2. Decoder architecture adopted in our approach.

$$\eta_w = \{w_{weight}, if(PoS(S_n) = class)\} \quad (6)$$

where w_{weight} is the weight of the word according the categorizing your class and $PoS(S_n)$ is the part-of-speech the S sentence. Thus, we apply the calculation of the weights in the set of training sentences, analyzing the PoS and inferring different weights according your word class and frequency, i.e., its occurrence into the sentence of a determine image.

$$PoS_{weight}(S) = \sum_{n=0}^{N_{token}(S)-1} (\eta_{w_n} * h_{n+1}) \quad (7)$$

where η_{w_n} is the parameter with the weight of the word n in the sentence S and h represents the hidden state at the instant of $n + 1$, these values being dependent of the class which words are classified.

$$PoS_{weight}(S) = [(0 * h_1) + (1.10 * h_2) + \dots + (1.10 * h_{10})] \quad (8)$$

After this step, the recurrent network is trained applying the weights from the $PoS_{weight}(S)$:

$$\tilde{h}_t = \varphi[X_t W_h + (R_t \odot h_{t-1}) U_h + b_h] \quad (9)$$

$$h_t = (1 - Z_t) \odot h_{t-1} + Z_t \odot \tilde{h}_t \quad (10)$$

The GRU receive a sequence of inputs, updating both the memory state and the hidden state of h_t . In this case, h_t is represented by h_{n+1} .

IV. EXPERIMENTS AND RESULTS

For realization out the experiments, we used two datasets, Flickr30k and MS-COCO. The Flickr30k has more than eight thousand images and the MS-COCO has more than one hundred and sixty-four thousand images. Each image, in both datasets has five descriptive sentences.

In our experiments we use Beam Search. The Beam Search it's one of search algorithms more popular for neural decoding models. In this model, we adopted two parameters for decodings, the parameter k (beam width for sentence generation) and α (weight of the language model). Table II shown the values of all parameters used for the realization out the experiments.

TABLE II
PARAMETERS USED IN THE EXPERIMENTS

Parameters	Value
Interactions	1 000
Otimizador	RMSProp
Dropout Rate	0.5
Learning Rate	1×10^{-5}
k (Beam Search)	5
α	0.8

The experiments were performed with an NVIDIA DGX-1, having 8 x Tesla V100 GPUs with a total memory of 512

GB and 2,133 MHz, DDR-4 RDIMM. Training the approach using PoS, it takes 2.5 and 4.5 on Flickr and MS-COCO, respectively.

We evaluated our model on the Flickr30k and MS-COCO datasets using the Bleu, Meteor, Cider, and Rouge evaluation metrics.

- The Bleu method implementation reason is to evaluate the quality of the descriptors by calculating the n -grams' accuracy between the reference phrases and the candidate phrases. There are several variations of the Bleu metric. However, the default metric requires a brevity penalty calculation P_b calculated as follows:

$$\mathbf{B}_p = \begin{cases} 1 & \text{if } c > r \\ e^{(1-r/c)} & \text{if } c \leq r \end{cases} \quad (11)$$

where r becomes the length of reference dataset and c the length of candidate translation. Thus, the Bleu metric can be determined by:

$$\text{BLEU} = B_p \cdot \exp\left(\sum_{n=1}^N w_n \log p_n\right) \quad (12)$$

where w_n are the sum of positive weights, and the precision of n -grams p_n is calculated using n -grams with maximum length of N .

- The Meteor metric can be calculated this way:

$$\text{METEOR} = \left(\frac{10PR}{R+9P}\right)(1-P_m) \quad (13)$$

where recovery and accuracy of *unigrams* are given by R and P , respectively. The concision penalty P_m is determined by:

$$P_m = 0.5\left(\frac{C}{M_u}\right) \quad (14)$$

where M_u is the number of corresponding unigrams and C is the minimum number of sentences required to match the *unigrams* outputs of reference translations.

- The Cider score for n -grams of length n can be calculated using the average similarity of consensus in between candidate sentences and reference sentences, which are necessarily responsible for accuracy and recovery:

$$\text{CIDER}_n(c_i, S_i) = \frac{1}{m} \sum_j \frac{g^n(c_i \cdot g^n(s_{ij}))}{\|g^n(c_i)\| \|g^n(s_{ij})\|} \quad (15)$$

where $g^n(c_i)$ it's a vector formed by $g_k(c_i)$ corresponding to all n -grams of length n and $\|g^n(c_i)\|$ is the magnitude of the vector $g^n(c_i)$. Similarly for $g^n(s_{ij})$, using n -grams highest order to capture semantic properties and grammatical richer. Therefore, one can match the scores of n -grams of varying in lengths this way:

$$\text{CIDER}(c_i, S_i) = \sum_{n=1}^N w_n \text{CIDER}_n(c_i, S_i) \quad (16)$$

- Formally, the Rouge is a recovery of n -grams in between a candidate summary and a set of reference abstracts. Rouge is calculated as follows:

$$\text{ROUGE} = \frac{\sum_{S \in S_H} \sum_{g_n \in S} C_m(g_n)}{\sum_{S \in S_H} \sum_{g_n \in S} C(g_n)} \quad (17)$$

where n represents the length of n -gram, g_n and C_m is the maximum number of n -grams that co-occur in a candidate summary and in a set of summaries of references.

A. Model Quality Evaluation

For the realization of quality evaluation of our model, we adopted the MS-COCO evaluation API. This API ensures consistency in the evaluation of caption generation algorithms using an evaluation service [18]. This evaluation service have the function of receiving the candidate captions, performing the classification of these captions through popular metrics, including Bleu metrics, Meteor, Cider, and Rouge.

For benchmarking, we selected the models proposed by Google NIC [19], Reference-based generation [20], Flickr30K-ATT and MS-COCO-ATT [1], Li and Kien [12], and m-GRU [2]. The Tables III and IV presents the results obtained by our model regarding other state-of-the-art models.

It was observed that our model reached the following scores: Bleu-1 (0.741), Bleu-2 (0.543), Bleu-3 (0.392), Bleu-4 (0.283), Meteor (0.302), Cider (0.591), and Rouge (0.482). Thus, the introduction of the PoS module reaches significant scores when compared to our model (without PoS). The PoS-based model just got lower score when compared to the cutting-edge model [12] na métrica Cider (0.591). The model proposed by Li and Kien [12], used a different decoder, based on Fast R-CNN structure, using LSTM to phrasal decoding of the image. Our model we apply multimodal GRUs that are fed by weights generated by the PoS analysis, generating weights according to the importance of each word in the sentence generation process.

It was observed that our model reached the the following scores: Bleu-1 (0.772), Bleu-2 (0.613), Bleu-3 (0.463), Bleu-4 (0.356), Meteor (0.302), Cider (1.092), and Rouge (0.557). These comparative results demonstrate that in the two datasets, the introduction of the PoS module reaches significantly higher scores when compared to our model (without PoS). Different from the previous result, in the MS-COCO dataset, our model achieved low score only on the Rouge metric (0.557) when compared to the state-of-the-art model [12].

We also evaluate the quality of sentences generated by our model (with PoS), comparing with the model that does not use the weights generation technique through PoS. Figure 3 shows the results of análise qualitativa das legendas generated by the two models.

We observed that the captions generated by the PoS-based model generate more descriptive sentences when compared to the model without PoS. However, in some cases, like for example in images with a difficulty level identifying objects in scenes (image 3 and 4), both models generate smaller size descriptions and similar. This can occur due to the size of

TABLE III
PERFORMANCE OF OUR PROPOSED MODELS ON FLICKR30K REGARDING IN BLEU 1-4, METEOR, CIDEr, AND ROUGE

Model	Flickr30k dataset				METEOR	CIDEr	ROUGE
	BLEU						
	B1	B2	B3	B4			
Google NIC [19]	0.663	0.423	0.277	0.183	–	–	–
Reference-based generation [20]	0.673	0.478	0.326	0.221	0.195	0.444	0.459
Flickr30K-ATT [1]	0.652	0.471	0.336	0.239	0.199	–	–
Li and Kien [12]	0.731	0.540	0.386	0.279	0.217	0.594	0.476
m-GRU [2]	0.669	0.405	0.289	0.200	0.295	0.483	–
Our model (without PoS)	0.651	0.418	0.271	0.207	0.198	0.450	0.448
Our model (with PoS)	0.741	0.543	0.392	0.283	0.302	0.591	0.482

TABLE IV
PERFORMANCE OF OUR PROPOSED MODELS ON MS-COCO REGARDING IN BLEU 1-4, METEOR, CIDEr, AND ROUGE

Model	MS-COCO dataset				METEOR	CIDEr	ROUGE
	BLEU						
	B1	B2	B3	B4			
Google NIC [19]	0.666	0.461	0.329	0.246	–	–	0.555
Reference-based generation [20]	0.768	0.605	0.458	0.342	0.261	1.055	–
Flickr30K-ATT [1]	0.734	0.566	0.428	0.322	0.254	0.999	–
Li and Kien [12]	0.761	0.581	0.449	0.349	0.267	1.091	0.558
m-GRU [2]	0.668	0.459	0.331	0.229	0.255	0.733	–
Our model (without PoS)	0.762	0.579	0.338	0.316	0.274	0.987	0.518
Our model (with PoS)	0.772	0.613	0.463	0.356	0.302	1.092	0.557

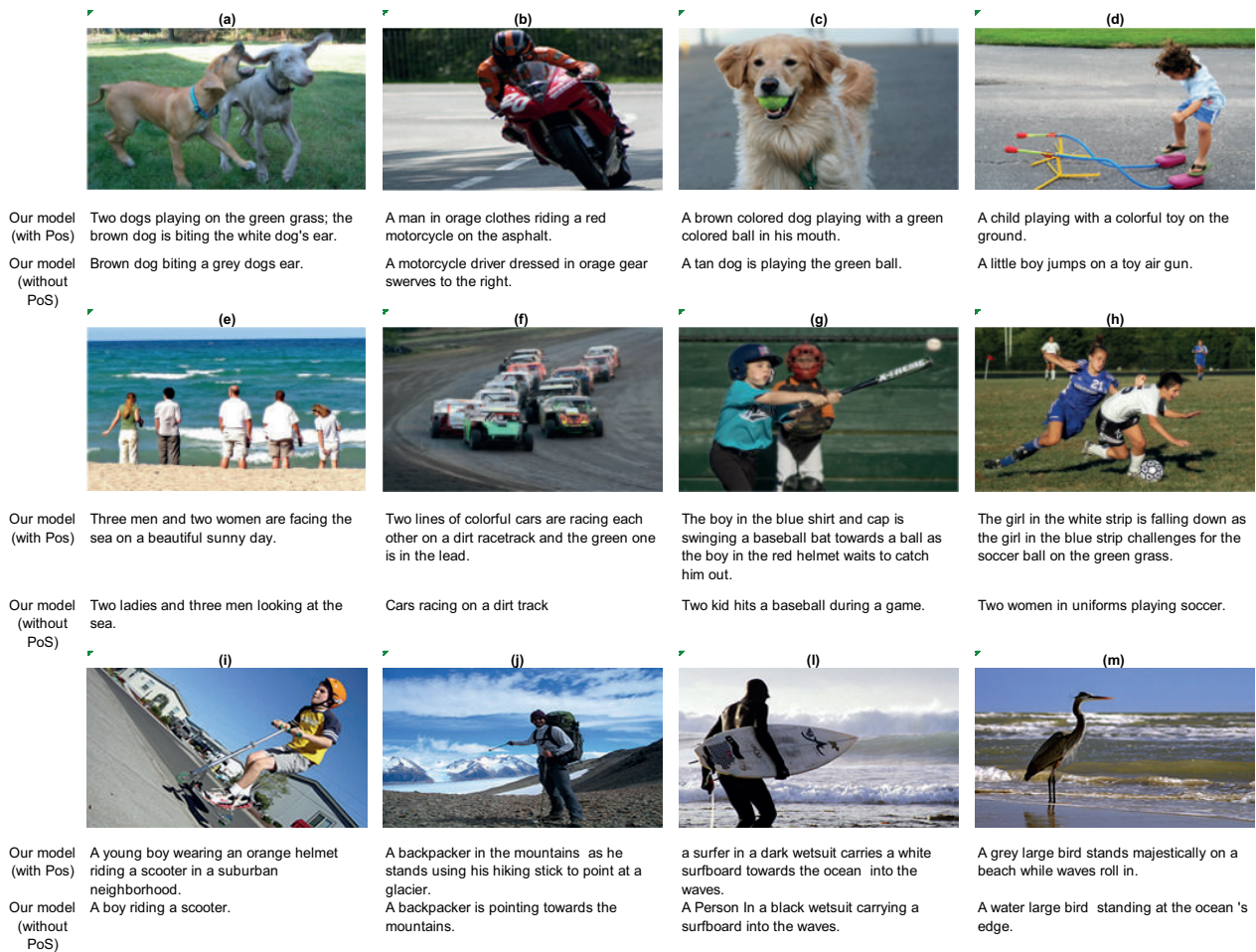


Fig. 3. Generation of Captioning for the input images using our model - with PoS and without PoS (figures from a to m)

the language module parameter. Therefore, in both models the parameter α it was the same, i.e., $\alpha = 0.8$.

Another parameter that can influence these results, would be the Beam Search size. However, during experiments we run the algorithms with different values, where we identify the value that generated better scores, consequently, generating better captions for the input image.

V. CONCLUSIONS

This paper presents an encoder-decoder model based in the analysis of PoS, generating different weights for training of the multimodal recurrent network. The proposed model promising performance were obtained when compared to the other cutting-edge models, in the two datasets, on Flickr30k and MS-COCO. Thus, the results demonstrate that application of PoS, generating significant weights for different classes of words get better performance than the model that does not use this technique, in both the datasets. We realized that the proposed model generates more descriptive captions, getting significant scores in the prediction captions. Therefore, the application of techniques capable to infer different weights, taking into consideration the importance of each word for the formation of the caption can reach significant results, being one promising path for the image captioning models.

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A Systematic Review Investigating the Use of EEG Measures in Neuromarketing

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Abstract—

Introduction: Neuromarketing employs numerous methodologies when investigating products and advertisement effectiveness. Electroencephalography (EEG), a non-invasive measure of electrical activity from the brain, is commonly used in neuromarketing. EEG data can be considered using time-frequency (TF) analysis, where changes in the frequency of brainwaves are calculated to infer participant's mental states, or event-related potential (ERP) analysis, where changes in amplitude are observed in direct response to a stimulus. This presentation discusses the findings of a systematic review of EEG measures in neuromarketing. A systematic review summarises evidence on a research question, using explicit measures to identify, select, and critically appraise relevant research papers. This systematic review identifies which EEG measures are the most robust predictor of customer preference and purchase intention.

Methods: Search terms identified 174 papers that used EEG in combination with marketing-related stimuli. Publications were excluded if they were written in a language other than English or were not published as journal articles (e.g., book chapters). The review investigated which TF effect (e.g., theta-band power) and ERP component (e.g., N400) most consistently reflected preference and purchase intention. Machine-learning prediction was also investigated, along with the use of EEG combined with physiological measures such as eye-tracking.

Results: Frontal alpha asymmetry was the most reliable TF signal, where an increase in activity over the left side of the frontal lobe indexed a positive response to marketing stimuli, while an increase in activity over the right side indexed a negative response. The late positive potential, a positive amplitude increase around 600 ms after stimulus presentation, was the most reliable ERP component, reflecting the conscious emotional evaluation of marketing stimuli. However, each measure showed mixed results when related to preference and purchase behaviour. Predictive accuracy was greatly improved through machine-learning algorithms such as deep neural networks, especially when combined with eye-tracking or facial expression analyses.

Discussion: This systematic review provides a novel catalogue of the most effective use of each EEG measure commonly used in neuromarketing. Exciting findings to emerge are the identification of the frontal alpha asymmetry and late positive potential as markers of preferential responses to marketing stimuli. Predictive accuracy using machine-learning algorithms achieved predictive accuracies as high as 97%, and future research should therefore focus on machine-learning prediction when using EEG measures in neuromarketing.

Keywords—EEG, ERP, neuromarketing, machine-learning, systematic review, time-frequency.

Understanding the Impact of Consumers' Perceptions and Attitudes toward Eco-Friendly Hotel Recommended Advertisements on Tourist Buying Behavior

Cherouk Amr Yassin

Abstract—This study aims to provide insight into consumer decision-making, which has become very complicated to understand and predict in the existing world of sustainable development. The deficiency of a good understanding of the tourist's perception and attitude toward sustainable development in the tourism industry may impede the ability of organizations to build a sustainable marketing orientation and may negatively influence predicted consumer response. Therefore, this research paper adds further insights into the attitude toward recommended eco-friendly hotel advertisements and their effect on the purchase intention of eco-friendly services. Structural equation modeling was completed to realize the effects of the variables under investigation. The findings revealed that consumer decision-making in choosing eco-friendly hotels is affected by the positive attitude toward sustainable development ads, influenced by informativeness, entertainment, and credibility as values perceived by eco-friendly hotels. This study provides practical implications for tourism, marketers, hotel managers, promoters, and consumers.

Keywords—Attitude, consumer behavior, consumer decision making, eco-friendly hotels, perception, tourism industry.

I. INTRODUCTION

PREVIOUSLY, it was assumed that the organization's strong financial and economic performance would ensure its success; however, this is no longer the case. Economic and financial outcomes must be accompanied by reduced environmental impacts and increased focus on social aspects. As a result, green management emerged in the 1990s and became a famous slogan on a global scale in 2000. Today's challenge for all marketers is to persuade consumers to choose their products or services over their competitors. Nowadays, marketers are trying to convince consumers to go green due to the growing importance of environmental sensitivity, which is becoming more common internationally [1]. The industry of hotels is starting to recognize the need to adopt sustainable business practices such as eco-labeling [2]. Consumer behavior research reveals how people think, feel, use, and dispose of products and services and their emotional, mental, and behavioral responses. All marketing decisions are founded on consumer behavior assumptions and knowledge [3]. The topic has steadily expanded to include the study of consumer behavior in sustainable environmental practices.

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Environmentally sustainable consumer behavior is essential for environmental protection that ultimately benefits society.

Natural resource exhaustion severely challenges the environment and its long-term viability [4], [5]. The issues are primarily related to environmentally irresponsible consumers' actions [5]-[8]. According to researchers, the critical concerns can be controlled and resolved by changing consumers' behaviors to be more ecologically friendly [9], [7]. Sustainable consumption starts by buying and consuming things in an environmentally friendly manner, a critical requirement for environmental sustainability [4].

The introduction of eco-labeling systems and their application in the tourism industry "as one of the most effective tools to achieve sustainable development" [2, p.642] began in the early 1990s [2]. There is a need to use social media recommended ads to inform consumers about eco-friendly hotels. Social media is a form of direct or indirect marketing in which individuals or companies build awareness, recognition, memory, and action. Furthermore, little empirical research examines customers' perceptions of environmentally friendly ads [10]. This research paper fills this gap by examining tourists' perception of eco-friendly hotel ads, referring to lodging establishments that follow various green practices such as water conservation, energy efficiency, and waste reduction. This study will analyze the influence of recommended ad perception on consumer purchase intention of eco-friendly hotels, considering the low level of consumption. The research investigates the effects of recommended ads on travelers' perceptions of a hotel's commitment to sustainability and their intention to stay at an eco-friendly hotel.

II. LITERATURE REVIEW

Sustainability in Tourism

Sustainable consumption, in particular, is becoming a hot topic in tourism and hospitality [4]. The consumption of eco-friendly and sustainable product development is becoming more critical than ever in the contemporary tourism and hospitality industry, as an increasing number of people in the marketplace recognize that many severe environmental deteriorations are rooted in tourism activities/development [11] [4]. Customers in this industry are increasingly demanding

green products (e.g., environmentally responsible hotels, restaurants, cruises, airlines, destinations, resorts, conventions, and casinos) and demonstrating a willingness to consume sustainably [11]-[13].

Water conservation, towel reuse, energy conservation, eco-product purchasing, local product use, reuse of plastic bags, and food waste reduction at tourist sites have all been extensively researched in the tourism and hospitality industry [14]-[16]. Reference [16] found that many studies focused on eco-friendly goods purchase behavior. Green hotels [13] and eco-friendly/sustainable destinations [15], [16] are among the most popular sustainable tourism industries. These green products meet the growing expectations of travelers and the market to become green. As a result, the destination offering such green products increases its competitiveness in tourist and hospitality.

Travelers' eco-friendly choice activity for green services for environmental preservation is referred to as pro-environmental buy as one essential form of environmentally sustainable consumer behavior in tourism and hospitality [9]. Complex pro-environmental decision-making processes [17] lead to environmentally responsible choices. Individuals who engage in ecologically friendly consuming activities have a lower environmental impact and benefit the environment [18], [19].

According to the reasoned action theory, a person's behavioral intention is formed by his or her attitude concerning the behavior and subjective norm [20]. In other words, the reasoned action theory acknowledges the value of attitude and social variables but applies them to the specific behavior of interest [21]. As a result, within this theory, the primary drivers of one's intention and behavior are one's attitude toward the behavior and the subjective norm that controls the action [22]. The degree to which doing specific conduct is viewed favorably or adversely is known as attitude toward the behavior [23]. It develops due to outcome beliefs and subjective values of expected outcomes [24]. The outcome beliefs, also known as behavioral beliefs, refer to an individual's perception of the likelihood that a particular activity would result in specific outcomes [24].

Recent research has found that travelers prefer ecologically friendly hotels, and some are ready to pay more [25]. Numerous hotels have adopted ecologically friendly methods to cater to their clients' pro-environmental beliefs. Due to the changing nature of sustainability and concern for green measures, eco-friendly hotels increasingly turn to social media to persuade passengers to make pro-environmental travel selections [26].

Perception of Eco-Friendly Hotel's Recommended Ads

Travelers' perceptions of an eco-friendly hotel's ads state that travelers feel that the eco-friendly hotel is committed to sustainability practices [27]. The hotel undertakes sustainability actions to advance the social good beyond the hotel's interests, as required by law [28]. Tourism and hospitality service providers have demonstrated varying commitment to sustainability practices (e.g., unscrupulous window displays, public announcements of participation in activities devoid of substance, and veritable efforts yielding favorable outcomes for both business and the environment) [29]. Consideration of

travelers' perceptions of the hotel's commitment to sustainability acts in an authentically socially responsible manner, as doing so can influence the extent to which travelers believe the hotel values environmental concerns and conducts sustainability practices and initiatives for the benefit of both the hotel and society [30].

According to [31], consumer decision is influenced by recommendations. In [32], it has been claimed that the likelihood of purchasing a suggested product is influenced by context, familiarity, and information. Ducoffe's advertising value model will include information, entertainment, and credibility in this study report [33]. As a result, hotels must comprehend the aspects that influence eco-friendly decisions. When preferences are raised, academics in consumer behavior have discovered that elements frequently impact consumers' preferences for the advertisement's channel [34], [35]. A consumer's response fluctuates depending on his or her beliefs, according to Fishbein's (1963) [20] expectancy-value theory. As a result, value is defined as a consumer's objective judgment of what to expect from them [36]. According to [37], value is subjective perceptions based on external influences.

Perception is how organisms explain and organize sensations to form a meaningful experience of the world [38]. This means that a customer is confronted with a circumstance or stimulus. Based on previous experiences, the consumer translates the stimuli into something relevant to him. However, what a customer perceives or understands may differ from reality. As a result, marketers value consumers' perceptions far more than their understanding of facts. Significantly, marketers and academics know perception and its associated models to determine what factors influence consumers' purchasing decisions.

In [33], the advertising value model is the most widely utilized theory to explain the attitudes toward advertising, it is based on three antecedents of advertising value: Informativeness, entertainment, and irritation, and it suggests a positive relationship between advertising value and advertising attitudes. Later, the model's irritation was removed, and its credibility was added [39], [40]. The concept developed by [33] will be used to determine the effects of the three antecedents of the advertising value model on eco-friendly recommended advertising.

Informativeness

Advertising informativeness is described as a company's capacity to tell customers about related products or services [33], allowing them to make quick judgments about the "highest value" product [41]. As a result, customers evaluate hotel advertisements on purpose since they provide an excellent source of exchanging information, displaying personal contacts, and providing additional service information [40], [42]. As an outcome, social media users are more interested in informative advertising on social media sites because the content is viral by nature, allowing users to share knowledge and learn from others' experiences [43], [44]. According to several studies, informativeness significantly impacts consumers' perceived value of social media advertising. The

more information the advertising provides consumers about the services provided, the more significant the impact on advertisements' value [40], [44], [45]. As a result, recommended eco-friendly hotel advertisements appear to a consumer engaged in the environmental activity, like or share posts that encourage a sustainable environment; therefore, it can be precious to consumers to know about the eco-friendly hotels. Thus, the following hypothesis is proposed:

H1. Informativeness positively influences consumers' perceptions of recommended eco-friendly hotels' advertising value.

Entertainment

According to [46], advertising entertainment is the pleasure and delight obtained from the commercial. Consumers use social media to find fun and relaxation, and their hedonic requirements can be easily met by advertising that provides them with pleasure and enjoyment [47]. Consumers are ENTERTAINED BY SOCIAL MEDIA ADVERTISING CONTENT BASED ON THE advertising styles [42]. Moreover, numerous studies have found a favorable association between perceived entertainment and perceived advertising value [40], [44]. In this context, entertainment-recommended eco-friendly hotel advertising can improve consumers' perceptions of advertising value. As a result, advertisers strive to produce engaging advertising to increase the impact of their message [48]. Thus, the following hypothesis is proposed:

H2. H2 Entertainment positively influences consumers' perceptions of recommended eco-friendly hotels' advertising value.

Credibility

Advertising credibility refers to the advertisement's believability and consumer expectations of its fairness [43] [49]. The content of an advertisement is judged to be reliable and trustworthy in the context of social media advertising when comments from social connections are displayed [50], [51]. Users have higher favorable perceptions of product advertising messages on social media, according to reference [52]. In this environment, social media advertising is increasingly regarded as a reliable source of product information by customers [53]. According to earlier research [40], advertising credibility negatively affects web advertising value. In the sustainable development context, a positively recommended eco-friendly advertising credibility leads to good impressions of recommended advertising. As a consequence, the following theory is put forth:

H3. H3 Credibility positively influences consumers' perceptions of recommended eco-friendly hotels' advertising value.

Recommended eco-friendly hotels and attitude toward eco-friendly services

Attitude is a mental state of motivation

organized by experience and affects an individual's attitude to all things and events [54]. However, there have been no apparent patterns in this domain yet causal linkages between knowledge and attitude or attitude and environmental behavior [55]. Research shows a disconnect between customers stated environmental attitudes and actions [56]. Given that environmental views have various dimensions [57], the disconnect could be due to consumers' strong feelings in some areas of concern vs. others.

Four functions shape attitudes; Knowledge function, Value expressive function, Utilitarian function, and Ego-Defensive function [58], [59]. The four influences shape attitudes, but usually, one influence can achieve it [2]. In this study, attitude will be treated as a Value expressive function in such a way that it will be shaped by how individuals value the recommended eco-friendly hotel advertising to affect their attitude toward the eco-friendly services. Therefore, it is possible to advance that H4. H4: Recommended eco-friendly hotels positively affects consumers' attitude toward eco-friendly services.

Attitude toward eco-friendly services and the buying behavior

Users who enjoy online advertising because it is interactive or personalized will develop a positive behavioral response toward it and react positively [43], [45]. Accordingly, The Theory of Reasoned Action [20] links the attitude to the product buying and the regularity of past buying and predicts the behavior. There is much controversy on how a positive attitude towards a company or a brand can influence behavior.

Environmental awareness involves having a positive attitude toward the importance of eco-friendly activities [57], [60]. This is grounded in cognitive consistency theory (Festinger 1957), whereby an individual concerned about ecological issues is also likely to be motivated to take actions to minimize those issues [60]. Environmental concern and environmentally friendly attitudes are positively related to consumers' intention to purchase green products [61], [57], [62]. Environmentally friendly customers have more excellent intentions to visit a green hotel and do so [61], [63].

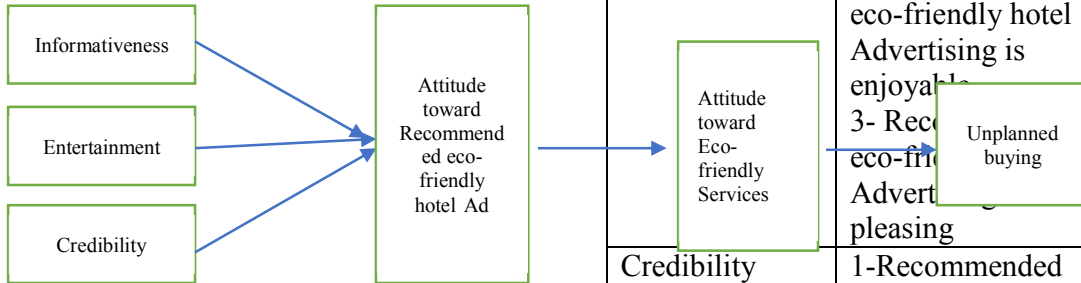
For example, [64] emphasized that favorable consumers' behavioral responses by clicking on the advertising to get additional information or purchasing the product on social media result from a favorable consumer attitude toward the advertisement [65]. So, it is possible to advance that:

H5. H4 favorable attitudes toward eco-friendly services affect unplanned tourist buying.

Research Model and Framework

The research model below is suggested in the prior literature review.

Figure. 1 Proposed Research Model



Methodology

Measurement Scales

The measure of constructs has been adapted from previous literature and updated with a modification to fit the study context. A five-point Likert scale was used to measure all the constructs. Then, a pilot study was performed with marketing scholars and experts. Table 1 indicates the measurement scales used in the study.

Table 1: Measurement Scales

Construct	Items	Author, Year
Informativeness	1-Recommended eco-friendly hotel Advertising supplies relevant information on the eco-friendly service. 2-Recommended eco-friendly hotel Advertising provides timely information on eco-friendly services. 3-Recommended eco-friendly hotel Advertising tells me about the eco-friendly services when I need the	[66]

Entertainment	1-Recommended eco-friendly hotel Advertising is entertaining 2- Recommended eco-friendly hotel Advertising is enjoyable 3- Recommended eco-friendly hotel Advertising is pleasing	[40] From [33]
Credibility	1-Recommended eco-friendly hotel Advertising is credible 2- Recommended eco-friendly hotel Advertising is trustworthy 3- Recommended eco-friendly hotel Advertising is believable	[40] From [49].
Recommended eco-friendly hotel Advertising Value	1- Recommended eco-friendly hotel Advertising is valuable for me. 2- Recommended eco-friendly hotel Advertising is helpful for me. 3- Recommended eco-friendly hotel Advertising is an essential source of information for me.	Adopted from [45]
Attitude toward eco-friendly service	1-in general, I think that the eco-friendly recommended advertising increases the cost of the service. 2-overall, I consider the eco-friendly recommended advertising a good thing.	[36] [64]

	<p>3-overall, I like the eco-friendly recommended advertising".</p> <p>4- "I consider the eco-friendly recommended advertising very essential."</p> <p>5- "I would describe my overall attitude toward the eco-friendly recommended advertising very favorably."</p>	
Unplanned Buying	<p>1- My purchase was spontaneous.</p> <p>2- My purchase was unplanned.</p> <p>3- I did not intend to make this purchase without the help of Recommender Systems.</p> <p>4- Before seeing the recommended advertising, I did not have the intention to make this purchase.</p> <p>5- I could not resist making this purchase after seeing the recommended advertising.</p>	[67]

Sampling Techniques

As people become more conscious of the environmental effect of various business activities, researchers suggest that an environmentally attentive consumer may be more likely to demonstrate pro-environmental behavior than other consumers [68]. As there is no sampling frame, convenience sampling was used. Active social media users of all demographics who are engaged in one group or follow at least one page for environmental protection

were chosen as the target population. The survey was distributed in different Facebook Groups for sustainable development and personal Facebook and Instagram accounts. All the respondents answered freely and anonymously.

Data Collection

The survey was distributed electronically in December 2021 and was held for two months. Overall, the survey collated 950 responses, 800 of which were validated see Table 2. Most of the sample (65%) were aged 19 to 28 years old; this indicates that most of the respondents who engaged in sustainability were between 19-28 years old; consequently, this age group could depend on making broad conclusions about this study.

Table 2: Demographic Variables

Variable		N	Percentage
Gender	Female	464	58%
	Male	336	42%
Age	<19	40	5%
	19-28	520	65%
	29-38	120	15%
	39-48	80	10%
	>49	40	5%
Total		800	100%

Results

The first stage was the Cronbach's coefficient alpha using SPSS, followed by testing the measurement model. A confirmatory factor analysis was conducted to test the research model's interrelationships.

Validity and Reliability

Cronbach's coefficient alpha was employed to test the reliability of the 22 relevant variables used in the factor analysis. From the analysis, the standardized item (alpha) for these variables ranged from 0.499 to 0.940, as demonstrated in Table 3. Each factor was scored more than 0.5 in alpha, suggesting excellent internal consistency of all constructs was more significant than the acceptable threshold value of 0.7, showing good reliability of the scales structure.

Table 3: Reliability of Instruments

Scale	Number of Items	Cronbach's Alpha
Informativeness	3	0.933
Entertainment	3	0.883
Credibility	3	0.855
Recommended Advertising Value	3	0.921
Attitude toward Recommended Advertising	5	0.774
Unplanned Buying	5	0.739

Confirmatory Factorial Analysis (CFA) was conducted to confirm which items fit what constructs and test the construct validity of variables. Table Four presents the construct validity results. The AVE for all items is above the recommended value of 0.50 [69], implying an excellent convergent validity. The discriminant validity was accomplished as the AVE of each construct is greater than the squared correlations with other constructs.

Table 4: Measurement of the total construct

Question items	Construct	Factor Loading	CR (t)	Probability	SMCC
Recommended eco-friendly hotel Advertising supplies relevant information on the eco-friendly service.	← Informativeness	.682	N/A	/A	.576
Recommended eco-friendly hotel Advertising provides timely information on eco-friendly services.	← Informativeness	.789	9.345	**	.433

Question items	Construct	Factor Loading	CR (t)	Probability	SMCC
Recommended eco-friendly hotel Advertising tells me about the eco-friendly services when I need the information.	← Informativeness	.795	9.896	**	.440
Measures: RMSEA: .000; Chisq/df: .975; NFI: 0.995; TLI: 0.996; CFI: 0.995; AVE: 0.587; CR: 0.567					
Recommended eco-friendly hotel Advertising is entertaining	← Entertainment	.664	8.987	N/A	.496
Recommended eco-friendly hotel Advertising is enjoyable	← Entertainment	.706	9.453	**	.487
Recommended eco-friendly hotel Advertising is pleasing	← Entertainment	.731	10.712	**	.586
Measures: RMSEA: .000; Chisq/df: .958; NFI: .978; TLI: .963; CFI: .982; AVE: 0.558; CR: 0.546					
Recommended eco-friendly hotel Advertising is credible	← Credibility	.723	7.097	/A	.498
Recommended eco-friendly hotel Advertising is trustworthy	← Credibility	.687	7.367	**	.599
Recommended eco-friendly hotel Advertising is believable	← Credibility	.675	7.211	**	.698
Measures: RMSEA: .000; Chisq/df: .973; NFI: .910; TLI: .926; CFI: .970; AVE: 0.645; CR: 0.584					

Question items	Construct	Factor Loading	CR (t)	Probability	SMCC
Recommended eco-friendly hotel Advertising is valuable for me.	← Recommended Eco-friendly hotel Advertising Value	.597	6.321	N/A	.596
Recommended eco-friendly hotel Advertising is helpful for me.	← Recommended Eco-friendly hotel Advertising Value	.698	7.235	**	.698
Recommended eco-friendly hotel Advertising is an essential source of information for me.	← Recommended Eco-friendly hotel Advertising Value	.662	7.209	**	.589
Measures: RMSEA: .000; Chisq/df: .967; NFI: .983; TLI: .987; CFI: .980; AVE: 0.562; CR: 0.548					
-in general, I think the eco-friendly recommended advertising increases the cost of the service.	← Attitude toward the eco-friendly service	.792	7.012	N/A	.583
overall, I consider the eco-friendly recommended advertising a good thing	← Attitude toward the eco-friendly service	.602	6.880	**	.441
overall, I like the eco-friendly recommended advertising".	← Attitude toward the eco-friendly service	.616	7.450	**	.594
"I consider the	←	.590	7.987	**	.399

Question items	Construct	Factor Loading	CR (t)	Probability	SMCC
eco-friendly recommended advertising very essential."	Attitude toward the eco-friendly service				
"I would describe my overall attitude toward the eco-friendly recommended advertising very favorably."	← Attitude toward the eco-friendly service	.786	7.643	**	.490
Measures: RMSEA: .000; Chisq/df: .954; NFI: .923; TLI: .944; CFI: .937; AVE: 0.621; CR: 0.601					
My purchase was spontaneous.	← unplanned buying	.731	N/A	/A	.520
My purchase was unplanned.	← unplanned buying	.759	12.599	**	.554
I did not intend to make this purchase without the help of Recommender Systems.	← unplanned buying	.818	11.432	**	.850
Before seeing the recommended advertising, I did not have the intention to make this purchase.	← unplanned behavior	.730	8.877	**	.512
I could not resist making this purchase after seeing the recommended advertising.	← unplanned buying	.770	8.987	**	.590
Measures: RMSEA: .053; Chisq/df: 121; NFI: .970; TLI: .965; CFI: .983; AVE: .565; CR: 0.532					

Question items	Construct	Factor Loading	CR (t)	Probability	SMCC
Whole Model Measures: RMSEA: .059; Chisq/df: 1.588; NFI: .990; TLI: .997; CFI: .971; AVE>0.5 CR: >1.97					

Construct	Construct	Estimate	S. E	CR	Probability
Informativeness	Value	.146	.096	1.774	***
Entertainment	Value	.2362	.094	1.680	***
Credibility	Value	.180	.091	1.918	***
Value	Attitude	.392	.108	3.786	***
Attitude	Unplanned Buying	.428	.169	3.831	***

Structural model and hypotheses test

The outcomes from the structural model are presented in Table 4. Generally, the model provides an excellent fit to the data with acceptable absolute, incremental, and parsimonious indices.

Based on Table 5 indicators, *H1* suggested a positive relationship between informativeness and recommended eco-friendly hotel advertising value was supported. Informativeness positively influences consumers' perceptions of recommended eco-friendly advertising value.

H2 states that entertainment positively influences recommended eco-friendly hotels' advertising value. This relationship was also statistically significant.

H3 stated that Credibility positively influences recommended eco-friendly hotels' advertising value was significant and supported.

H4 suggested that eco-friendly hotels recommended advertising value positively and significantly influenced consumers' attitudes toward eco-friendly services was also statistically significant in the study.

Similarly, *H5*, which advances a positive relationship between attitudes toward eco-friendly services, and consumers' unplanned buying, was also significant.

Table 5. Hypotheses Relationship

Discussion

This study's results offer theoretical and practical implications for recommended advertising and sustainable buying behavior. Ethical consumer behavior, including ecological and human welfare issues, is growing intensely [70]. In many consumer behavior studies, researchers have tried to understand buying behavior [71]. This paper adds further insights into the effect of attitude toward recommended eco-friendly hotel advertisements and its effect on the unplanned buying of eco-friendly services.

Theoretical implications

Based on our results, the study suggested a significant impact of eco-friendly recommended advertising informativeness, entertainment, and Credibility on consumers' perceptions of eco-friendly recommended advertising value. This result is similar to a past study that showed that the probability of buying a recommended service depends on the familiarity and information provided [32] and [72]. They suggested that online shopping influences buying behavior since consumers simply know how to browse product information in the online context. In turn, advertising value positively influences consumer attitude toward the eco-friendly recommended ad.

Though, the favorable attitude toward eco-friendly services considerably impacts unplanned buying behavior. The result suggests that consumers are more likely to be involved with the product or service whenever they find a recommended advertisement through social media. Some research has behavioral effects of recommender systems on consumer decisions [73]. The study also captured all the age categories, confirming that the ages between 19 and 28 primarily engage customers for sustainable environment advertisements.

Marketing implications

Recommended advertising can be positive because it makes consumers feel deeply understood, objectively or subjectively. Consumer categorizations may help consumers satisfy identity motives when perceived as social labels [74]. Moreover, introduce them to a needed new product [75]. Therefore, the research results guide to endorse of the eco-friendly recommended products in the hotels marketing strategies with more information, entertainment and credibility toward building a sustainable marketing orientation.

Notwithstanding AI's capacity to forecast and satisfy preferences, users can feel exploited in data capture experiences, mainly because they do not understand its operating criteria, which is a result of the several features of AI. Thus, as consumer behavior becomes increasingly tailored to the exigencies of behavioral futures, this side needs to educate consumers about the recommended system.

Limitations and directions for future research

This study is not without limitations concerning research design and methodology characteristics. To begin with, we must refer to the fact that we used a convenience sample. Convenience sampling is a nonprobability sampling in which people are sampled because they are accessible data sources for researchers [76]. In reference, [77] stated that one of the limitations of nonprobability sampling is its weakness in selection biases; subsequently, all suitable respondents may not stand an equal chance of being selected as a sample. The study recruited only Facebook and Instagram users who engaged in sustainable development, which we believe was an essential component for selecting our unit of

analysis. Hence, more studies are needed to understand the impact of changes in recommendation systems on consumption behavior.

Furthermore, models in attitude measurement to predict and understand buying behavior are necessary [20]. They should be applied to different industry types to understand the effect of social media on sustainable buying behavior.

Conclusion

To the best of our knowledge, this research paper was the first to address the relationship between attitudes towards eco-friendly hotel recommended advertising, attitudes toward eco-friendly service, and unplanned buying behavior. The secret to increasing sales throughout social media is to sell services that bid immediate satisfaction and provide good value through information, entertainment, and Credibility. However, consumers are needed to reduce the cognitive and affective costs associated with excessive information and choice through AI [78], [79] and thereby give consumers greater control over their data without overloading them with unneeded recommendations and advertising. We do not understand the link between customers' eco-friendly attitudes and their behavior, particularly hotel purchases and green program participation [80]. Consequently, this research examines the difference between customers' beliefs regarding whether a hotel should have a green practice or not. Moreover, staying in a hotel that offers such green practices is essential.

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A Pilot Questionnaire Study of Students' Entrepreneurial Intentions in Higher Education in Turku University of Applied Sciences, Finland: A Multidisciplinary Perspective

Jaana Kallio-Gerlander and Päivi Killström

Abstract— The purpose of this paper is to provide an insight for developing entrepreneurial competencies and knowledge among university students from different graduate programs and try to comprehend the graduate students' intentions which lead an individual to become an entrepreneur. The aim on this study is to clarify the paradox in Finland, which is that willingness to start a business is one of the lowest in Europe, but the startups receive annually more and more funding from investors.

In Turku University of Applied Sciences appear several paths for students for gaining entrepreneurial competencies. This study presents results of a Webropol surveys conducted for 826 students. The programs included were eight. The survey was open the time of four months. Data received from 254 students was analyzed with SPSS statistical tool to obtain the results.

Entrepreneurial competencies include the body of knowledge about entrepreneurship such as the information about paperwork, jurisdictional issues, managerial skillset, and the source of finance. Moreover, teamwork, critical thinking, risk taking, opportunity searching and taking responsibility of one's own behavior and actions are discussed.

Findings show that according to regression analysis there is a significant association between attitude towards entrepreneurial education and entrepreneurial intention. An entrepreneurial education attracts more males than females. The entrepreneurial family background is determining to an entrepreneurial career. Some findings also refer to decreasing of entrepreneurial intentions while studying in the entrepreneurial education.

The value of the paper is that it provides guidelines of implementing the entrepreneurship studies in universities and especially in interdisciplinary groups. It also shows that diversity of entrepreneurship is more complex than expected and moreover this remark makes it even more attractive to students.

Keywords—competence, entrepreneurship, intention, interprofessional.

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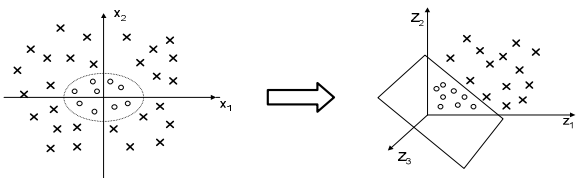


Fig. 3 Mapping nonlinear data to a higher dimensional feature space

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Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]–[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] shows ...” Unfortunately the **WASET** document translator cannot handle automatic endnotes in *Word*; therefore, type the reference list at the end of the paper using the “References” style.

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TABLE I
UNITS FOR MAGNETIC PROPERTIES

Symbol	Quantity	Conversion from Gaussian and CGS EMU to SI ^a
Φ	magnetic flux	1 Mx \rightarrow 10 ⁻⁸ Wb = 10 ⁻⁸ V·s
B	magnetic flux density, magnetic induction	1 G \rightarrow 10 ⁻⁴ T = 10 ⁻⁴ Wb/m ²
H	magnetic field strength	1 Oe \rightarrow 10 ³ /(4 π) A/m 1 erg/G = 1 emu
m	magnetic moment	\rightarrow 10 ⁻³ A·m ² = 10 ⁻³ J/T 1 erg/(G·cm ³) = 1 emu/cm ³ \rightarrow 10 ³ A/m
M	magnetization	1 G \rightarrow 10 ³ /(4 π) A/m
$4\pi M$	magnetization	1 G \rightarrow 10 ³ /(4 π) A/m
σ	specific magnetization	1 erg/(G·g) = 1 emu/g \rightarrow 1 A·m ² /kg 1 erg/G = 1 emu
j	magnetic dipole moment	\rightarrow 4 π × 10 ⁻¹⁰ Wb·m
J	magnetic polarization	1 erg/(G·cm ³) = 1 emu/cm ³ \rightarrow 4 π × 10 ⁻⁴ T
χ, κ	susceptibility	1 \rightarrow 4 π
χ_p	mass susceptibility	1 cm ³ /g \rightarrow 4 π × 10 ⁻³ m ³ /kg 1 \rightarrow 4 π × 10 ⁻⁷ H/m
μ	permeability	= 4 π × 10 ⁻⁷ Wb/(A·m)
μ_r	relative permeability	$\mu \rightarrow \mu_r$
w, W	energy density	1 erg/cm ³ \rightarrow 10 ⁻¹ J/m ³
N, D	demagnetizing factor	1 \rightarrow 1/(4 π)

No vertical lines in table. Statements that serve as captions for the entire table do not need footnote letters.

^aGaussian units are the same as cgs emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second, T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.

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$$\int_0^z F(r, \varphi) dr d\varphi = [\sigma r_2 / (2\mu_0)] \cdot \int_0^\infty \exp(-\lambda |z_j - z_i|) \lambda^{-1} J_1(\lambda r_2) J_0(\lambda r_i) d\lambda. \quad (1)$$

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (T might refer to temperature, but T is the unit tesla). Refer to “(1),” not “Eq. (1)” or “equation (1),” except at the beginning of a sentence: “Equation (1) is”

E. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: “zero-field-cooled magnetization.” Avoid dangling participles, such as, “Using (1), the potential was calculated.” [It is not clear who or what used (1).] Write instead, “The potential was calculated by using (1),” or “Using (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Use “cm³,” not “cc.” Indicate sample dimensions as “0.1 cm × 0.2 cm,” not “0.1 × 0.2 cm².” The abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m²” or “webers per square meter,” not “webers/m².” When expressing a range of values, write “7 to 9” or “7-9,” not “7~9.”

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The word “data” is plural, not singular. The subscript for the permeability of vacuum μ_0 is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” A graph within a graph is an “inset,” not an “insert.” The word “alternatively” is preferred to the word “alternately” (unless you really mean something that alternates). Use the word “whereas” instead of “while” (unless you are referring to simultaneous events). Do not use the word “essentially” to mean “approximately” or “effectively.” Do not use the word “issue” as a euphemism for “problem.” When compositions are not specified, separate chemical symbols by en-dashes; for example, “NiMn” indicates the intermetallic compound Ni_{0.5}Mn_{0.5} whereas “Ni–Mn” indicates an alloy of some composition Ni_xMn_{1-x}.

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IX. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments. Avoid expressions such as "One of us (S.B.A.) would like to thank" Instead, write "F. A. Author thanks" Sponsor and financial support acknowledgments are placed in the

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More Than Financial Wealth: An Empirical Study on the Impact of Family Involvement on the Dimensions of Exit Success

Tim Vollmer, Andrea Greven, Malte Brettel

Abstract—Family firms represent the predominant business structure worldwide, accounting for 90 percent of all operational businesses. These firms are essential to society and the economy. In the past decade, family firm exits increased by 72%; and in the next five years, 95,000 German family firms will be sold, acquired, or liquidated. For family firms, socioemotional wealth represents the frame of reference and value to preserve when making decisions. Family firm exits threaten socioemotional wealth, as in extreme scenarios, economic logic may take over. So, a dilemma arises: Maintaining socioemotional wealth versus pursuing financial wealth?

Family firm researchers agree that family involvement leads to specific goals, behaviors, and outcomes. For instance, the desire to protect socioemotional wealth when selling the firm and the focus on particular exit success dimensions, depending on the family's role inside the firm.

However, despite the regularity of family firm exits, there is little research on the effect of family involvement on the family firm CEOs' perceived exit performance. We investigate the family firm CEOs' perceived exit performance, which we call exit success. Considering the deficiencies in the literature, we identify two research gaps. First, it remains unclear how family involvement affects the dimensions of exit success. Hence, we provide evidence of which success dimensions matter most depending on the family's involvement and how to differentiate successful from unsuccessful exits. Second, prior work has analyzed family involvement in the socioemotional wealth context but found contradictory findings. This work considers, for example, the family generation in control and identifies the tipping point of economic objectives becoming preferable over socioemotional wealth-related goals.

This paper theorizes and empirically investigates, through the lens of socioemotional wealth and conflict theory, how socioemotional wealth mediates the relationship between family involvement and family firms' exit success. We analyze family firms' exit success dimensions of personal financial benefits, personal reputation, employee benefits, and firm mission persistence. Family involvement considers the family firms' heterogeneity in ownership, management, and generation.

We use a quantitative approach in the form of an online survey by drawing on 116 responses from former family firm CEOs'. This study highlights that socioemotional wealth mediates the relationship between the dimensions of family involvement and exit success. The greater socioemotional wealth, the greater the family firm CEOs

focus on the pro-organizational exit success dimensions of employee benefits and firm mission persistence. In contrast, the self-regarding dimension of personal financial benefits is significantly negatively affected. An important finding is that later generations and the number of family managers involved significantly negatively affect the two pro-organizational dimensions of exit success. Family ownership does not show any significant effect.

Our work widens implications for research, theory, and practice by contributing in two meaningful ways. First, our results offer insights to differentiate successful from unsuccessful family firm exits and provide evidence of which success dimensions matter and which to focus on, most dependent on the family's role inside the firm. Second, our article advances research and empirical understanding of family firms and socioemotional wealth by clarifying contradictory findings.

Keywords—Exit Success, Family Firm Exit, Perceived Exit Performance, Socioemotional Wealth

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Hydrogen Production by Photoreforming of N-Butanol and Structural Isomers Over Pt Doped Titanate Catalyst

Hristina Šalipur, Jasmina Dostanić, Davor Lončarević, Matej Huš

Abstract— Photocatalytic water splitting/alcohol photoreforming have been used for conversion of sunlight energy in process of hydrogen production due to its sustainability, environmental-safety, effectiveness and simplicity. Titanate nanotube are frequently studied materials since they combine the properties of photo-active semiconductors with the properties of layered titanates, such as ion-exchange ability. Platinum (Pt) doping into titanate structure has been considered as an effective strategy in better separation efficiency of electron-hole pairs and lowering the overpotential for hydrogen production which results in a higher photocatalytic activity. In our work Pt doped titanate catalysts were synthesized via simple alkaline hydrothermal treatment, incipient wetness impregnation method and temperature programmed reduction. The structural, morphological and optical properties of the prepared catalysts were investigated using various characterization techniques such as X-ray diffraction (XRD), scanning electron microscopy (SEM), N₂ physisorption, diffuse reflectance spectroscopy (DRS). The activities of the prepared Pt-doped titanate photocatalysts were tested for hydrogen production via photocatalytic water splitting/alcohol photoreforming process under simulated solar light irradiation.

Characterization of synthesized Pt doped titanate catalysts showed crystalline anatase phase, preserved nanotubular structure and high specific surface area. The result showed enhancement of activity in photocatalytic water splitting/alcohol photoreforming in the following order 2-butanol>1-butanol>tert-butanol, with obtained maximal hydrogen production rate of 7.5, 5.3 and 2 mmol g⁻¹ h⁻¹ respectively. Different possible factors influencing the hole scavenging ability such as: hole scavenger redox potential and diffusivity, adsorption and desorption rate of the hole scavenger on the surface and stability of the alcohol radical species generated via hole scavenging were investigated. The theoretical evaluation using density functional theory (DFT) further elucidated the reaction kinetics and detailed mechanism of photocatalytic water splitting/alcohol photoreforming.

Keywords—hydrogen production, platinum, semiconductor, water splitting, density functional theory.

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Design of Aesthetic Acoustic Metamaterials Window Panel Based on Sierpiński Fractal Triangle for Sound-Silencing with Free Airflow

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Abstract

Design of high- efficiency low, frequency ($<1000\text{Hz}$) soundproof window or wall absorber which is transparent to airflow is presented. Due to the massive rise in human population and modernization, environmental noise has significantly risen globally. Prolonged noise exposure can cause severe physiological and psychological symptoms like nausea, headaches, fatigue, and insomnia. There has been continuous growth in building construction and infrastructure like offices, bus stops, and airports due to urban population. Generally, a ventilated window is used for getting fresh air into the room, but at the same time, unwanted noise comes along. Researchers used traditional approaches like noise barrier mats in front of the window or designed the entire window using sound-absorbing materials. However, this solution is not aesthetically pleasing, and at the same time, it's heavy and not adequate for low-frequency noise shielding. To address this challenge, we design a transparent hexagonal panel based on Sierpiński fractal triangle which is aesthetically pleasing, demonstrates normal incident sound absorption coefficient more than 0.96 around 700 Hz and transmission loss around 23 dB, while maintaining the air circulation through triangular cutout. Next, we present a concept of fabrication of large acoustic panel for large-scale applications which lead to suppressing the urban noise pollution.

Keywords— acoustic metamaterials, ventilation, urban noise pollution, noise control.

Topological Spaces of Integral Domains

Shai Sarussi

Abstract— Let S be an integral domain which is not a field, let F be its field of fractions, and let A be an F -algebra. An S -subalgebra R of A is called S -nice if $R \cap F = S$ and $FR = A$. A topological space is called an Alexandroff space if every element has a minimal open set containing it. Inspired by the well-known Zariski-Riemann space, we define a topology on the set of all S -nice subalgebras of A . Consequently, we get a better understanding of the S -nice subalgebras of A , due to the different points of view of algebra and topology. It is shown that the union of all elements of an irreducible subset of S -nice subalgebras of A is its supremum; and a characterization of a nonempty open set having a maximal element is given.

Keywords— topological spaces, Alexandroff spaces, integral domains, algebras over a field.

Existence of Global Branch of Positive Solutions for a Class of Discontinuous Problems

Said Hakimi, Hajar Chahi

Abstract— In this paper, we study the existence of a global branch of positive solutions in a ball for a class of elliptic problems when the nonlinearity is discontinuous. This study can be done by using the bifurcation theory and topological degree theory.

Keywords— nonlinear boundary value problems, global bifurcation, positive solution, degree theory.

SiC Crystallization Obtained as a Side Effect of SF₆ Etching Process

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Abstract—Silicon carbide (SiC) is a wide band-gap semiconductor material with very attractive properties, such as high breakdown voltage, chemical inertness, high thermal and electrical stability, which makes it a promising candidate for several applications, including microelectromechanical systems (MEMS) and electronic devices. In the MEMS manufacturing, the etching process is an important step. It has been proved that wet etching of SiC is not feasible due to its high bond strength and high chemical inertness. In view of this difficulty, the plasma etching technique has been applied with paramount success. However, in most of these studies, only the determination of the etching rate and/or morphological characterization of SiC, as well as the analysis of the reactive ions present in the plasma are lowly explored. There is a lack of results in the literature on the chemical and structural properties of SiC after the etching process [4]. In this work, we investigated the etching process of sputtered amorphous SiC thin films on Si substrates in a reactive ion etching (RIE) system using sulfur hexafluoride (SF₆) gas under different RF power. The results of the chemical and structural analyses of the etched films revealed that, for all conditions, a SiC crystallization occurred, in addition to fluoride contamination. In conclusion, we observed that SiC crystallization is a side effect promoted by structural, morphological and chemical changes caused by RIE SF₆ etching process.

Keywords—plasma etching, plasma deposition, Silicon Carbide, microelectromechanical systems.

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Sedimentological and Geochemical Characteristics of Aeolian Sediments and Their Implication for Sand Origin in the Yarlung Zangbo River Valley, Southern Qinghai-Tibetan Plateau

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Abstract

The understanding of the dynamics of aeolian sand in the Yarlung Zangbo River Valley (YLZBV), southern Qinghai-Tibetan Plateau, including its origins, transportation, and deposition, remains preliminary. In this study, we investigated the extensive origin of aeolian sediments in the YLZBV by analyzing the distribution and composition of sediment's grain size and geochemical composition in dune sediments collected from the wide river terraces. The major purpose is to characterize the sedimentological and geochemical compositions of these aeolian sediments, trace back to their sources, and understand their influencing factors. As a result, the grain size and geochemistry variations, which showed a significant correlation between grain sizes distribution and element abundances, give a strong evidence that the important part of the aeolian sediments in the downstream areas were firstly derived from the upper reaches by intense fluvial processes. However, the sediments experienced significant mixing process with local inputs and reconstructed by regional wind transportation. The diverse compositions and tight associations in the major and trace element geochemistry between the up- and down-stream aeolian sediments and the local detrital rocks, which were collected from the surrounding mountains, suggest that the upstream aeolian sediments had originated from the

various close-range rock types, and experienced intensive mixing processes via aeolian- fluvial dynamics. Sand mass transported by water and wind were roughly estimated to qualify the interplay between the aeolian and fluvial processes controlling the sediment transport, yield, and ultimately shaping the aeolian landforms in the mainstream of the YLZBV.

Keywords: Grain size distribution; Geochemistry; Sand source; Wind and water load; Yarlung Zangbo River Valley.

Digital Citizenship Education: Perceptions on the Concept and Self-Reported Competences of Georgian School Society

Marika Sikharulidze, Sofiko Lobzhanidze, Giorgi Urchukhishvili

Abstract—This paper presents the results of an exploratory project on Digital Citizenship Education (DCE) conducted within the Georgian Education system. Data were collected following an exploratory sequential design (qualitative + quantitative), and data analysis exposed that school society members are aware of the DCE concept but lack proper competencies to apply DCE in their everyday practice. This exploratory study is part of a broader research project aimed at infusing DCE in educational policy and school culture through pre-service and in-service activities.

Keywords—digital citizenship education, educational policy, school culture, exploratory sequential design.

First Surveillance Results Bring no Evidence of SARS-CoV-2 Spillback in Bats of Central-Southern Italy

First H. Dakroub, Second D. Russo, Third L. Cistrone, Forth F. Serra, Fifth G. Fusco, Sixth E. De Carlo, Seventh M. G. Amoroso

Abstract— The question of the origin of SARS-CoV-2 and the cycle of transmission between humans and animals is still unanswered. One serious concern associated with the SARS-CoV-2 pandemic is that the virus might spill back from humans to wildlife, which would render some animal species reservoirs of the human virus. The aim of the present study is to monitor the potential risk of SARS-CoV-2 reverse infection from humans to bats, by performing bat surveillance from different sites in Central-Southern Italy. We collected 240 droppings or saliva from 129 bats and tested them using specific and general primers of SARS-CoV-2 and coronaviruses respectively. All samples, including 127 nasal swabs and 113 fecal droppings resulted negative for SARS-CoV-2, and these results were confirmed by testing the samples with the Droplet Digital PCR. Also, an end-point RT-PCR was performed and no sample showed specific bands. The absence of SARS-CoV-2 in the bats we surveyed is a first step towards a better understanding of reverse transmission to bats of this virus. We hope our first contribution will encourage the establishment of systematic surveillance of wildlife, and specifically bats, to help prevent reverse zoonotic episodes that would jeopardize human health as well as biodiversity conservation and management.

Keywords— coronaviruses, bats, zoonotic viruses, spillback, SARS-CoV-2.

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Targeted Photodynamic Therapy for Intra-peritoneal Ovarian Cancer, A Way to Stimulate Anti-Tumoral Immune Response

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Abstract — Ovarian cancer (OC) is one of the most defying diseases in gynecologic oncology. Even though surgery remains crucial in the therapy of patients with primary ovarian cancer, recurrent recidivism calls for the development of new therapy protocols to propose for patients dealing with this cancer. FR α is described as a tumor-associated antigen in OC, where FR α expression is usually linked with more poorly differentiated, aggressive tumors. The Photodynamic treatment (PDT) available data have shown improvements in the uptake of small tumors and in the induction of a proper anti-tumoral immune response. In order to target specifically peritoneal metastasis, which overexpress FR α , a new-patented PS coupled with folic acid has been developed in our team. Herein we propose PDT using this new patented PS for PDT applied in an *in vivo* mice model.

The efficacy of the treatment was evaluated in mice without and with PBMC reconstitution. Mice were divided into four groups: Non-Treated, PS, Light Only, and PDT Treated and subjected to illumination by laser set at 668nm with a duration of illumination of 45 minutes (or 1 min of illumination followed by 2 minutes of pause repeated 45 times). When mice were not reconstituted and after fractionized PDT protocol, a significant decrease in the tumor volume was noticed. An induction in the anti-tumoral cytokine IFN γ chaperoned this decrease while a subsequent inhibition in the cytokine TGF β . Even more crucial, when mice were reconstituted and upon PDT, the fold of tumor decrease was even higher. An immune response was activated decoded with an increase in NK, CD3⁺, LT helper and Cytotoxic T cells. Thereafter, an increase in the expression of the cytokines IFN γ and TNF α were noticed while an inhibition in TGF β , IL8 and IL10 accompanied this immune response activation.

Therefore, our work has shown for the first time that a fractionized PDT protocol using a folate-targeted PDT is effective for treatment of ovarian cancer. The interest in using PDT in this case, goes beyond the local induction of tumor apoptosis only, but can promote subsequent anti-tumor response. Most of the therapies currently used to treat ovarian cancer, have uncooperative outcome on the host immune response. The readiness of a tumor adjuvant treatment like PDT adequate in eliminating the tumor and in concert stimulating anti-tumor immunity would be weighty.

Keywords — Folate receptor, Ovarian Cancer, Photodynamic Therapy, Humanized mice model

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Overlaps and Intersections: An Alternative Look at Choreography

Ashlie Latiolais

Keywords—dance, architecture, choreography, installation, architect, choreographer, space.

Abstract—Architecture, as a discipline, is on a trajectory of extension beyond the boundaries of buildings and, more increasingly, is coupled with research that connects to alternative and typically disjointed disciplines. A “both/and” approach and (expanded) definition of architecture, as depicted here, expands the margins that contain the profession. Figuratively, architecture is a series of edges, events, and occurrences that establishes a choreography or stage by which humanity exists. The way in which architecture controls and suggests the movement through these spaces, being within a landscape, city, or building, can be viewed as a datum by which the “dance” of everyday life occurs. This submission views the realm of architecture through the lens of movement and dance as a cross-fertilizer of collaboration, tectonic, and spatial geometry investigations. “Designing on digital programs puts architects at a distance from the spaces they imagine. While this has obvious advantages, it also means that they lose the lived, embodied experience of feeling what is needed in space—meaning that some design ideas that work in theory ultimately fail in practice.” By studying the body in motion through real-time performance, a more holistic understanding of architectural space surfaces and new prospects for theoretical teaching pedagogies emerge. The atypical intersection rethinks how architecture is considered, created, and tested, similar to how “dance artists often do this by thinking through the body, opening pathways and possibilities that might not otherwise be accessible” —this is the essence of this poster submission as explained through *unFOLDED*, a creative performance work. A new language is materialized through *unFOLDED*, a dynamic occupiable installation by which architecture is investigated through dance, movement, and body analysis. The entry unfolds a collaboration of an architect, dance choreographer, musicians, video artist, and lighting designers to recreate one of the first documented avant-garde performing arts collaborations (Matisse, Satie, Massine, Picasso) from the Ballet Russes in 1917, entitled *Parade*. Architecturally, this interdisciplinary project orients and suggests motion through structure, tectonic, lightness, darkness, and shadow as it questions the navigation of the dark space (stage) surrounding the installation. Artificial light via theatrical lighting and video graphics brought the blank canvas to life — where the sensitive mix of musicality coordinated with the structure’s movement sequencing was certainly a challenge. The upstage light from the video projections created both flickered contextual imagery and shadowed figures. When the dancers were either upstage or downstage of the structure, both silhouetted figures and revealed bodies are experienced as dancer-controlled installation manipulations occurred throughout the performance. The experimental performance, through structure, prompted moving (dancing) bodies in space, where the architecture served as a key component to the choreography itself. The tectonic of the delicate steel structure allowed for the dancers to interact with the installation, which created a variety of spatial conditions — the contained box of three-dimensional space, to a wall, and various abstracted geometries in between. The development of this research unveils the new role of an Architect as a Choreographer of the built environment.

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Military Sexual Assault Prevention and Response: A Case Study of Coast Guard Male Victim Advocates

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Abstract—To address the challenge of eliminating sexual assault from the ranks of the Coast Guard and to care for members that have been assaulted, the role of Sexual Assault Response Coordinator (SARC) and Sexual Assault Prevention and Response (SAPR) Victim Advocate (VA) were created. Although numerous studies have detailed the trauma of sexual assault and rape within the military services, and the devastating toll it takes on the lives of its members, there has been limited attention paid to the military advocates that combat rape and assault on the front-lines. This exploration of male Coast Guard Victim Advocates provides a greater understanding of their experiences, engagement, and leadership, and the influences that have driven their commitment to advocacy. This study employs a social norms approach as its theoretical framework, arguably the most appropriate lens to understand the intricacies of the experiences of male SAPR Victim Advocates and how they interpret those experiences. The primary method of data collection was the interview, to allow individual voices to be heard from within the ranks of the Coast Guard. This research examines three essential questions: What are the perceptions of male Coast Guard SAPR Victim Advocates regarding their role in sexual assault prevention and response in the U.S. Coast Guard? How do male Coast Guard SAPR Victim Advocates support sexual prevention and response in the U.S. Coast Guard? How do male Coast Guard SAPR Victim Advocates perceive the influence of social norms within the U.S. Coast Guard's sexual assault prevention work? The key finding was that the SAPR Victim Advocate comprises an extremely important function Coast Guard sexual abuse prevention efforts.

Keywords—Sexual Assault Prevention and Response, Sexual Assault Response Coordinator, Sexual Assault Prevention and Response Victim Advocate, Social Norms Approach.

“Lightyear” – The Battle for LGBTQIA+ Representation Behind Disney/Pixar’s Failed Blockbuster

Emá Vitória Fonseca Lavrador

Abstract— In this work, we intend to explore the impact that the film "Lightyear" (2022) had on the social context of its production, distribution, and reception. This film, produced by Walt Disney Animation Studios and Pixar Animation Studios, depicts the story of Buzz Lightyear, a Space Ranger from which the character of the same name in the "Toy Story" film franchise is based. This prequel was predicted to be the blockbuster of the year, but it was a financial fiasco and the subject of numerous controversies, which also caused it to be drowned out by the film "Minions: The Rise of Gru" (2022). The reason for its failure is not based on the film's narrative or quality but on its controversial context for being a commitment to LGBTQIA+ representation in an unexpected way, by featuring a same-sex couple and showing a kiss shared by them. This representation cost Disney distribution in countries against LGBTQIA+ representation in media and involved Disney in major disagreements with fans and politicians, especially for being a direct opposition to the Florida House Bill 1557, also called the “Don't Say Gay” bill. Many major companies have taken a stand against this law because it jeopardizes the safety of the LGBTQIA+ community, and, although Disney initially cut the kiss off the film, pressure from the staff and audience resulted in unprecedented progress. For featuring a brief homosexual kiss, its exhibition was banned in several countries and discouraged by the same public that was previously the focus of Disney's attention, as this is a conservative “family-friendly” branded company. We believe it is relevant to study the case of "Lightyear" because it is a work that raises awareness and promotes representation of communities affected during the dark times while less legislation is being approved to protect the rights and safety of queer people.

Keywords— Disney/Pixar, “Don't Say Gay” bill, gender stereotypes, LGBTQIA+ representation, lightyear

I. INTRODUCTION

We will start by characterizing the impact that Walt Disney Animation Studios and Pixar Animation Studios companies have as producers of animation blockbusters and why the film “Lightyear” (2022) is the first film that appeals for the awareness of the audience on LGBTQIA+ rights. In this way, we will also investigate which homophobic stereotypes are most commonly found in children's feature films and how productions have evolved to appeal to their audience's understanding of social causes and inequality.

The social context in which “Lightyear” was produced was the reason why Disney decided to take a position contrary to what would please the mass audience. The passage of laws against freedom of sexual orientation and gender identity has been legally repressed and that became the motive for Disney's decision to reveal a same-sex relationship and kiss in the latest

film. For this reason, we will analyze the case of "Lightyear", its narrative, aesthetic and social context, to understand its uniqueness as a potential blockbuster that featured a lesbian couple. We will also contrast this film with its rival, "Minions: The Rise of Gru", made by Universal's Illumination Entertainment studios, to distinguish the aspects that led the latest film of the "Despicable Me" franchise to become the public's favorite. Unfortunately, "Lightyear" fell short of monetary expectations and audience adherence, but the wide coverage it received from the media marked the position of the production companies against the repressive policy spreading across the USA.

Finally, we will analyze the bill which Disney was fighting against and the relevance of the film "Lightyear" as a declaration for LGBTQIA+ visibility by a company branded as "family-friendly". This representation cost Disney distribution in countries against LGBTQIA+ rights and involved Disney in major disagreements with fans and politicians, especially for being a direct opposition to the Florida House Bill 1557, also called the “Don't Say Gay” bill, a law designed to keep queer topics out of schools and ensure that parents are made aware of their child's gender identity and sexual orientation by school staff.

II. INCLUSIVITY AND VISIBILITY IN DISNEY/PIXAR’S MOVIES

Production companies such as Disney and Pixar are film producers that aim their products at an audience of all ages. As producers of blockbusters and mass hits, their works have the ability to influence and raise awareness as agents capable of developing the spectator's emotional, social and cognitive understanding. It is due to the compassion between the experiences of the characters and the experiences of the audience that film studies have been exploring the portraits of social minorities in these films, as a way of comprehending how they reflect society and raise awareness. Unfortunately, the portrayal of diversity is scarce in the mass media, which is why Disney and Pixar's commitment to exploring new situations and characters is important to break stigmas and depict progress and equality in their narratives [1].

In the 21st century it is possible to see films with homosexual characters and their love stories, however, the large number of spectators who disapprove of the union of same-sex couples continues to be the main factor for these films to be censored. The same is present with racial minorities in films. Many of the

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films that feature characters from social minorities fall into offensive stereotypes and do not take advantage of the films' ability to educate, which restricts them to a form of entertainment [2]. Despite Disney giving visibility to minorities of race, age and gender, the company continues to struggle to break stereotypes, especially those that go against the image that the company has had since its creation in 1930, as a producer of conservative nostalgias and American family values.

Rarely portrayed in a Disney movie, the LGBTQIA+ community is a visibility gap, and when it has representation it is mainly associated with villains, as Disney villains do not fit into the conventional Hollywood standard of the villain who steals the girl or the villainess who steals the boy. Instead, they are portrayed as "anti-couple" figures with signifiers that provoke the audience to label them as queer or homosexual. Despite the interpretive barrier of the message, in more recent films we can see that critics and viewers more easily classify a character as representative of the LGBTQIA+ community because there is less sub-text associated with her performance. In spite of that, there is a pattern to the visibility Disney gives to homosexuals, as most of its works represent homosexuality in upper-middle-class white male characters with social consideration and disposable income. On the other hand, the groups with lower consumption capacity (lesbians who deal with the gender difference in wages, homosexuals of color...) are rarely portrayed [3].

This subtext and room for interpretation regarding a character's homosexuality or queerness can be considered "queercoding". Queercoding has been present in Disney films since 1950, and queer theorists consider that "Frozen" (2013) is the first film to break the stereotype that only villains can be presented with queer and homosexual subtext, as Elsa's story can be interpreted as a homosexual protagonist living like an outcast in a homophobic society [4]. In Disney films the male characters that are considered effeminate are usually villains, as if they are being condemned for their way of being, opposing them to the strong male hero, and the female characters are also the subject of controversy, due to their strong personality sometimes associated with sexual orientation. Highlighting the recent controversy around the film "Frozen 2" (2019), there was a movement that encouraged the creation of a hashtag to give Elsa a female character to have a relationship with: #GiveElsaAGirlfriend. Nevertheless, the request was ignored by the company.

The expression of love and desire between same-sex couples in Disney and Pixar productions is uncommon. Even though there is a visible kiss between LeFou and Gaston, in the 2017 remake of "Beauty and the Beast", and a gay couple protagonism in Pixar's short film "Out" (2020), the mere mention of the police officer Specter (a minor character) having a girlfriend in the movie "Onward" (2020) was enough to get it banned from multiple Middle East markets. In 2022, during the production of the movie "Lightyear", Disney was accused of financially aiding the anti-LGBTQIA+ legislation that would later pass the "Don't Say Gay" bill in Florida, which we will explore further on. Due to this controversy stemming from

Disney's conservative beginnings, Pixar workers stated that they were required to censor LGBTQIA+ content in their films and that the company advocated retrograde policies. Due to this news becoming public, Pixar restored the scene of a love kiss between two women, the space ranger Alisha Hawthorne and a scientist named Kiko, which had been removed from the final version of the work [5].

It is due to the fear of alienating conservative consumers by giving prominence to homosexual characters that they are rarely present in narratives. However, nowadays, the number of young people who affirm and defend their identity and rights within the LGBTQIA+ community is growing, and companies that do not follow this progress are at risk of being considered "Old-school". In Disney's case, although it reflects conservative "family values" in their movies, many spectators use their stories and protagonists to explore subtext and reimagination in order to fight censorship and identify themselves with the animation classics [6].

III. "LIGHTYEAR", THE TALE OF A FAILED BLOCKBUSTER

In 2022 the film "Lightyear" premiered in theaters, and, despite the predictions that this work would be a success, a set of social factors influenced its reception by the public. We will now analyze the narrative and aesthetics of the film so that we can then contextualize the reasons for the public to disregard this work, and what led to its failure in both box office and distribution.

A. Aesthetic and narrative analysis

"Lightyear" tells the origin story of Buzz Lightyear and the Star Command outside the "Toy Story" universe. For this film, director Angus MacLane wanted to tell the story of why Andy falls in love with the Buzz Lightyear toy in the 1995 film, and because the character is an action figure from a movie MacLane wondered, "Why don't we just make that movie?" [7]. Even though the film focuses on Buzz, there are a number of relevant characters that join the hero on his journey, highlighting Alisha Hawthorne, Buzz's commanding officer and best friend, Izzy Hawthorne, Alisha's granddaughter Buzz's new friend and partner, Sox, a robot companion cat, and Emperor Zurg, the villain we recognize from the "Toy Story" franchise.

Plot-wise, the film begins with the arrival of Buzz, Alisha and their crew on a hostile planet 4.2 million light-years from Earth [8]. After Buzz fails to get around an obstacle with his spaceship, the crystal with the ability to reach hyperspeed is destroyed, and the crew gets stranded on the unknown planet. Stuck in a survival situation, Buzz does test drives to try to achieve hyperspeed with new crystals and get everyone back home, but his attempts only take him further into the future, spending years instead of seconds on each test drive. Every time he returns to the planet, he realizes that a civilization has established itself and is thriving, and as he follows the aging of Alisha and her family, Buzz is increasingly lonely, until her death leaves him alone.

Because of his new commander discrediting Buzz's advances towards hyperspeed, the Space Ranger allies his expertise with Sox, his robot cat offered by Alisha to prevent his loneliness,

and both manage to create a crystal capable of moving them through space. After the crystal is stolen by servants of the villain Emperor Zurg, Buzz gets help from Izzy, Alisha's granddaughter who tries to follow her footsteps, and her crew. With them, Buzz is able to face Emperor Zurg and his robot followers, facing him in a battle for the hyperspeed crystal.

The battle between Buzz and Zurg intensifies when Buzz discovers that Zurg looks like him, not being his father (reference to the science fiction trope) but Buzz himself from the future. In order to defeat Zurg and save the planet, Buzz wrecks the crystal and gives up on his mission, realizing he can have a life on the new planet as a Space Ranger alongside Sox, Izzy and his newfound friends.

Regarding aesthetics, in an interview to "D23" [9], the official Disney fan club, the director talks about the aesthetic and technical decisions he made for the film that differ from the cinematography of "Toy Story". First, it is based on a typical science-fiction film setting with an "out-of-this-world" action-adventure plot. In the interview, MacLane says that he sought to create tactile and robust sensations in the world, inspired by the industrial design on spaceships and materials capable of portraying the film's era. In addition, the director paid special attention to the cinematography, keeping in mind a chiaroscuro aesthetic with notorious contrasts between the light and dark. As for technical quality of the CGI (Computer Generated Imagery), MacLane started experimenting by asking a modelmaker who used to work at ILM (Industrial Light & Magic) to make a 3D spaceship. After analyzing the model, the team had to understand what were the features that they should implement in the virtual models in order to give them veracity. Knowing that the animators were able to make the models and sets so real that they could be confused with live-action, the care of the production was to distinguishing the threshold between the design of the characters and the world created for them. It was in the concern between the balance of surfaces, color, texture and interaction that the visuals originated, and by respecting the characteristic features of science-fiction films, "Lightyear" can be interpreted as an echo of what was done in the past, and as a love letter for cinema.

B. The portrait of Buzz Lightyear, from "Toy Story" to "Lightyear"



Fig.1 - Buzz Lightyear in "Lightyear"

Although this narrative focuses on the character in which the Buzz toy in the "Toy Story" franchise is based, this Buzz does not have the same personality that is presented to us in the "Toy Story" films. "Lightyear" tells the story of the "real" Buzz, a Space Ranger in a diegetic world inspired by the science-fiction

genre, with the aim of following the journey of the character from a young test pilot to the highly regarded Space Ranger of Star Command [10].

The Buzz introduced to us in "Toy Story" is a high-tech toy who does not believe he is a toy, but thinks he is actually a real Space Ranger with the mission is to defend the galaxy. Disbelieving the convictions of the other characters who try to explain to Buzz that he is actually a toy like them, Buzz tries to use his knowledge and his built-in gadgets to prove them wrong, however he fails. At the end of the film, Buzz is called to his reality by the other toys, and realizes that his uniqueness is not defined by his abilities, but by the relationship he has with his owner, Andy [11]. This way, the story of the newcomer Buzz has an ending that differs from what we usually see in superhero movies. After his adventure, Buzz realizes that he is actually "ordinary", the same as the other toys, and that he is not on a mission on an unknown planet, so he can finally relax, take off his helmet and be with his new family [12].

In "Lightyear", Buzz is portrayed as we recognize from the early moments of "Toy Story". In the 1995 film, Buzz toy thinks he is on an unknown planet while he fulfils his mission to save the galaxy. In the 2022 film, Buzz finds himself on a hostile planet after landing his spaceship, and it is after a failed escape attempt that he and his crew must explore the planet, when Buzz starts his mission to take them back home. Due to the temporal anomalies that Buzz overcomes on his test drives, his experience of time becomes different from the rest of the planet's inhabitants, which leads Buzz to isolate himself and only trust Alisha, who always supported him when he blamed himself for being trapped on that planet. Just like Buzz toy, the Space Ranger dedicates his life on completing his mission, even if it prevents himself from connecting to the world around him. It's when he faces Emperor Zurg and is about to complete his mission that he reflects on the promise he made to Alisha, the life she had on that planet with her family and granddaughter Izzy, and the people who, like her, thrived on that planet. Realizing it was wrong to change the past, Buzz defeats the villain, gives up on the mission and returns home with his newfound family.

In both narratives, Buzz is a born hero, dedicated to his missions but, more importantly, dedicated to help others, and despite being easily isolated, he manages to find his home on an "unknown planet".

C. The portrait of Alisha Hawthorne and Izzy Hawthorne

As we can see in films from the last decades, since 1989, the female protagonists of Disney films are characterized by the desire to break the gender standards imposed by society, so female characters appear as rebels against patriarchal structures and go beyond expectations. Although in the first Disney stories the princesses depend on miracles or princes to be happy, in the new generation of hits, from 2010 to the present, the characters strive to make their dreams come true.

In this way, the films encourage audiences to think beyond what society stipulates, and to adopt attributes that are not consistent with gender roles. It is also important to note that the

works by these companies are expanding their way of portraying love, such as sisterhood (e.g., *Frozen*), mother-daughter relationships (e.g., *Brave*), and friendships (e.g., *Ralph Breaks the Internet*). Exploring gender norms and breaking down social barriers associated with them gives these films a much-lauded feminist image in the media. Even though Disney and Pixar are promoting more gender awareness than the rival companies, women are still underrepresented, and with the media promoting diversity in characters and narratives, the companies are now trying to secure their place at the forefront of even controversial themes for the general public such as LGBTQIA+ issues [13].

Many of the Disney and Pixar's films have ambitious and fierce female protagonists, with diverse physical characteristics and with aspirations beyond the domestic realm, and, in "Lightyear", these features can be seen in female characters, especially in Alisha and Izzy Hawthorne. Alisha Hawthorne is a main character and Buzz's commander and best friend. She is presented with a strong and determined personality, and, like Buzz, she is passionate about her work as a Space Ranger and wants the best for her crew. When stranded in the hostile planet, Alisha reveals her fighting and command skills, assigning roles to ensure the safety of the crew and success of the new mission: returning home.

After Buzz's first test drive, while Buzz experienced 4 minutes Alisha experienced 4 years, and when he returns Alisha has started a new chapter of her life and is engaged to Kiko, a scientist she met in the society formed on the planet. Buzz continues to leave on mission, which makes him unable to be part of Alisha's life, that he follows from afar. Despite the distance, Alisha introduces Buzz to her son with Kiko, and, after she passes away, she leaves him a video she recorded with her young granddaughter, Izzy, telling her about her friend and Space Ranger who was in space, and Izzy says that one day she will also be a Space Ranger. After Alisha's death, Buzz disobeys the new commander's orders and takes one last test drive. Even though he managed to achieve the hyperspeed he so craved, he unintentionally advanced 22 years into the future, when he meets the grown-up Izzy on a very different planet than the one he had left.



Fig. 2 - Alisha years after the beginning of the story

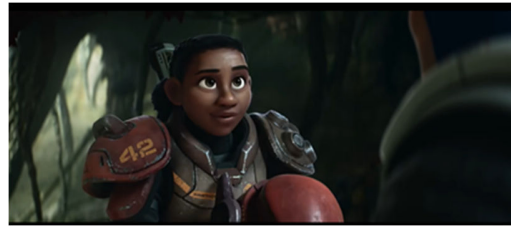


Fig. 3 - Izzy's first appearance

Izzy Hawthorne is a main character of the film and the leader of Junior Zap Patrol (composed by her, Mo Morrison and Darby Steel), a volunteer team of self-motivated cadets, inspired by the stories of the Space Rangers, who long to become protectors of the society of the planet. Even decades later, Izzy's dream remains to become a Space Ranger, inspired by her grandmother and the stories about Buzz, but lucklessly she has a deep fear of space, which stands in the way of fulfil her dream.

Despite Buzz's reluctance for help after losing the hyperspeed crystal to a servant of Emperor Zurg, Izzy, her patrol and the robot cat Sox join him on his quest. During the film Buzz, is reminded by Izzy of the good times he had with Alisha, and Izzy is motivated by Buzz to overcome her fears and make her dream come true. At the beginning of their journey, the Space Ranger has to instruct the Junior Zap Patrol to fight, strategize and use space suits, skills that would prove to be very useful to them, and because of their collaboration Buzz manages to reach Emperor Zurg. After the adventure the team has put together, Buzz has a new sense of family, and declines Emperor Zurg's offer to go back in time and create an alternate reality in which his actions would erase Alisha and Kiko's life together, along with Izzy's existence.

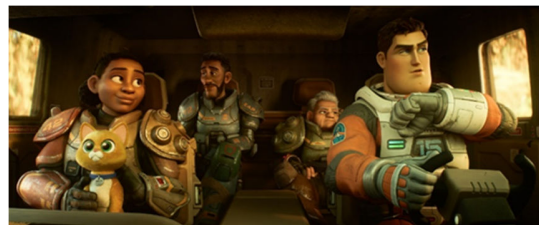


Fig. 4 - Sox, Izzy Hawthorne, Mo Morrison, Darby Steel and Buzz Lightyear (left to right)

The portrait of strong and determined woman is visible in the character Alisha as well as in Izzy. By the time Alisha enters the narrative, she is a commander, respected by her male peers and maintains strong friendships with them. After Buzz begins test drives, Alisha leads the individuals on the planet and helps to build a civilization. The power she has as a black woman in the highest rank of the diegetic society becomes even more significant when it is presented that she has a romantic relationship with Kiko, a white woman and scientist that briefly appears alongside Alisha. As a lesbian couple, they live a love story and have a family, their descendants. From what can be seen between the time lapses of the narrative, Alisha will have been in charge of the planet's civilization until she became an elder, and there can be seen a statue in her honor at the end of the film.

As for Izzy, the young leader of Junior Zap Patrol that Buzz even mistakes for Alisha when he first sees her, she reveals to be fierce and ambitious like her grandmother and admires her from a young age. With the Space Ranger program cancelled, Izzy prepares herself and her team for the future they have longed for, and, despite having a deep fear of space, she risks her life to save Buzz and faces fear like a true heroine.

IV. WOKENESS IN "LIGHTYEAR"'S HOMOSEXUAL VISIBILITY

A. Distribution failure and audience awareness

As we have been analyzing, the wokeness of "Lightyear" is something new that distinguishes this work from the rest of Disney and Pixar's productions, and the approach of queer themes challenged Disney's stand as a conservative and family-centered company. Because this film failed to capture the attention of its usual audience, there was one film that caught the attentions of the general public and got the success that was predicted for the spin-off of the popular "Toy Story" franchise. With the archive of being the highest-grossing family film since the pandemic first closed theaters in 2020, "Minions: The Rise of Gru" (2022), a slapstick-centric comedy, contested "Lightyear" with childish jokes and easy narrative, winning over the film's marketing flaw and controversies [14].

"Minions: The Rise of Gru", the latest film of the "Despicable Me" franchise made by Universal's Illumination Entertainment studios, brings the same clichés as the other films in the series, bright colors and lots of humor. We have highlighted many sides of "Lightyear" that move away from the formula of "Toy Story", such as aesthetic and narrative, and even the character Buzz has a different personality and voice actor, but what created conflicts in relation to the work is the same-sex kiss that appears in the film. Notwithstanding the brilliant story and character development in the Disney/Pixar film, audiences still do not go to theaters to see Buzz Lightyear's new narrative, something Chris Evans, the new Buzz voice actor, criticized for being an audience unwilling to see progress [15]. Due to the decision to keep a lesbian kiss in the film, "Lightyear" was banned in 14 Middle Eastern and Asian countries and fell victim to conservative and homophobic arguments that defined the decision as a "moral breakdown", what made those opposed to the film spread the word to prevent parents from showing it to their children.

This representation, only kept in the film by request of the employees, could have been in a more activist position on the part of Disney, since the couple's brief and toned down appearance in the film is considered only as "passive progressive". Despite this, in the midst of the cultural and legal battle against the LGBTQIA+ community, Disney is trying to position itself as an ally, shocking the conservative followers who have always been favored by the company [16].

B. The "Don't Say Gay" bill

According to the Human Rights Campaign [17], 2021 was the record year for the most anti-LGBTQIA+ legislation. In the state of Florida, a particular law known as "Don't Say Gay", comprised of bills HB 1557 and SB 1834, was created to remove education about the LGBTQIA+ community from

schools. In addition, the school is required to disclose any information regarding a student's gender identity or sexual orientation to its parents or guardians within six weeks of the discovery. Activists claim that eradicating the LGBTQIA+ presence from school, a place that should be educational and safe, makes it difficult for each student to discover their identity or sexuality, driving them to feel ashamed and encouraging them to hide.

Since the unfortunate event of the Pulse nightclub shooting in 2016, education and awareness on queer rights have been critical to ensuring the safety of the community. Pulse - Orlando, Florida gay nightclub - was the victim of a hate attack in the early morning of June 12, 2016. Many religious and conservative people believe that since the legalization of same-sex marriage in 2015 there is no discrimination or that there is no reason to create anti-discrimination laws. The truth is that violence against homosexuals persists and that the shooting at the Pulse club was not an act of Muslim terrorism, but a gay hate crime in a state that promotes gay hatred. As people from the LGBTQIA+ community represent a small percentage of the population, the only way to ensure that laws are not formed against the community is for non-gay allies to fight for them. The events on Pulse sparked a nationwide discussion about the use of weapons and the need for gun control, yet, for creating the efforts to change anti-gay perceptions and legislation has not happened, and people in the community continue to fear being bullied, threatened and perceived as weak [18].

The "Don't Say Gay" bill became official on the 1st of July, as an alignment plan for the Parental Rights in Education, and has already been revealed to have had an impact on the queer community. Following, in Figure 5, is an image of a document that was given to the staff of a school regarding the student's need for authorization from a parent or guardian to use a different name or pronoun in the school. Likewise, it is written that parents and guardians must be notified if the student reveals something that has to do with gender identity, sexual orientation, or is just questioning. It also mentions that if the student expresses concern that their parents or guardians may be violent if they found out, the school should call the Florida Department of Children and Families [19].

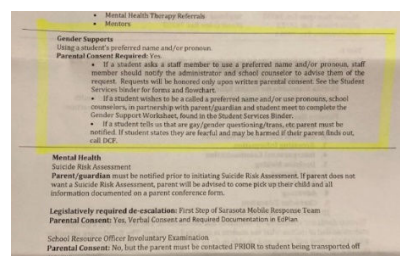


Fig. 5 - Memo sent to school teachers and administrators

C. "Lightyear" as an oppositional stance to anti-LGBTQIA+ legislation

The passage of HB 1557 was a cause of scandals and protests, not only in Florida but throughout the United States. After the signing, the employees of The Walt Disney Company exposed that Disney was not doing enough to oppose the law

and its threat to the safety of the LGBTQIA+ community. This exposure led to the creation of the hashtag "#DisneyDoBetter", which, after some insistence, prompted Disney CEO, Bob Chapek, to acknowledge his regret and push back the support of the law. The request also called for a more inclusive work environment and appealed to the company to withdraw all monetary support associated with politicians who support HB 1557 [20]. To retaliate against the company's opposition, the State of Florida stripped Disney of its self-governing status, and Florida Governor, Ron DeSantis, declared that Disney would pay its fair share of taxes. Even though Disney has 75,000 employees and is the largest single-site employer in Florida, Chapek's new stance against the Governor and the "Don't Say Gay" bill remains firm [21].

On March 9th, LGBTQIA+ workers and allies at Pixar Animation Studios made a statement saying that Disney actively censors gay-affectionate content. This statement, coupled with the company's prolonged silence in response to the "Don't Say Gay" bill, resonated. According to a source close to the production, the scene of the kiss between Alisha Hawthorne and Kiko had been removed from "Lightyear", although their romantic relationship was never called into question. Afterwards, according to information revealed by the company's workers concerning the controversy between Chapek and anti-LGBTQIA+ legislation, the scene was restored and maintained in the film [22]. Although Disney keeps being accused of censoring homosexual moments in its films, the company takes a drastic change in "Lightyear", in spite of that decision having cost the audience and distribution of the film.

In Figure 6, we can see the scene in which Alisha's son is introduced to us and the characters Alisha and Kiko share a love kiss, and in Figure 7 a photograph of a sign outside a movie theater in Oklahoma, advising parents that there is a scene of a kiss between a same-sex couple and that the scene would be passed on, apologizing for the inconvenience [23].

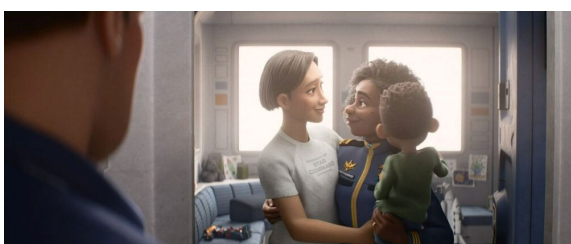


Fig. 6 – Alisha, Kiko and their son



Fig. 7 - "Lightyear"'s same sex kiss warning sign

By maintaining the lesbian kiss in the film, that was only kept

for the cause of raising awareness of LGBTQIA+ values, Disney assumed an inevitable financial loss of not having the film in conservative country markets, but also turned the work into a target for homophobic actions and comments. Within the juvenile audience and family markets, the possibility of seeing a homoaffectionate kiss in cinema can be self-identifying and contribute to self-acceptance, in addition to promoting awareness among the general public. While Disney's shift towards supporting LGBTQIA+ rights is slow, it is possible that the stance against the "Don't Say Gay" bill is the first step regarding progress, highlighting the need for companies to be proactive in safeguarding social minorities [24].

V. CONCLUSION

Disney films aimed at a children's audience have been heavily criticized for casting LGBTQIA+ characters as villains or in low-profile roles, but also for creating queercoding and maintaining disrespectful stereotypes for economic and marketing reasons. With this study, we can branch the qualities and controversies associated with the film "Lightyear", as well as the social context of its production, with the objective of analyzing the importance that this film has in the representation of the LGBTQIA+ community, especially for being the first feature film by Disney and Pixar to present a kiss between a same-sex couple.

The feature of a same-sex kiss shared between a main character, Space Ranger Alisha Hawthorne, and her wife, a scientist named Kiko, caused reactions in theaters, social networks, and media, as the film served as an act of confrontation between Disney/Pixar and the "Don't Say Gay" bill, a law in favor of keeping LGBTQIA+ education out of schools. In addition to this particularity, the determination of keeping the kiss in the film was made in a time when Disney's position on LGBTQIA+ rights was a gray area, until the company's employees advocated for change. It was the replacement of the scene after it was removed, and the company's battle with the state of Florida, what gave the victims of the new law hope and marked what can be the first step in the fight against queer censorship.

The creation and perpetuation of anti-LGBTQIA+ legislation are challenging for the community, especially legislation that prohibits gender identity and sexual orientation education, such as the HB 1557. It has been known since the Pulse club shooting in 2016 that awareness is what creates security for people in the community, and the further we get away from representation and awareness, the more difficult it becomes the survival of people who do not identify with the norms sustained by conservative values. That is why the film "Lightyear" fulfills its role as a weapon against disinformation and underrepresentation, showing black women protagonists with high positions and responsibilities, one of them being part of a homosexual marriage with descendants. The characters Alisha and Izzy Hawthorne, two generations of the same family, have social and cultural urgency, and their visibility gives families and individuals the ability to identify with for the first time in a Disney film.

Prohibiting freedom of expression, limiting security and

promoting disinformation have in the past proved to be inadequate forms of education. Therefore, the role that “Lightyear” is taking on in the battle between conservative values and queer rights, despite having suffered a huge economic loss and been featured in countless controversies regarding its unexpected failure, is a step towards progress and LGBTQIA+ representation.

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Worldwide Prosperity Through Democracy: A Cross-country Examination of the Impact of Democratization on Human Development from 1990

Martin Plener

Abstract— Developmental and democratization research has a long tradition of focusing on the relationship between democratization and economic development. However, recent studies have shown that economic development is not adequate to measure the actual living conditions of civilian people. In consequence, it is unclear if a democratization process helps to improve people's quality of life. This work addresses this issue by investigating the influence of democratization on the Human Development Index (HDI) created by the United Nations. The main objective is to study the relationship between democracy and human development and whether democratization positively impacts the living conditions of the population over time. The main mechanism which supports a positive impact is that democratic structures promote participation and political involvement of people from all social classes resulting in a better articulation of interests and thus accountability to the government. To study this issue, a panel regression with Fixed-Effects is conducted. By that, it is examined if democracy has a positive impact on the HDI (Hypothesis 1) and secondly if the same effect weakens in more developed democracies compared to less developed democracies (Hypothesis 2). The results do not reveal a direct positive relationship between the democratization of a country and its development of the HDI, not supporting H1 which denies the first hypothesis. In contrast to the assumption of H2, the effect of democratization on human development seems to be negatively correlated in countries in which democracy is barely developed. Therefore, both hypotheses must be discarded. The results indicate rather a positive correlation between economic development on human development. Therefore, the impact of democracy on the well-being of countries' citizens needs to be reinvestigated in order to create a better understanding of how improved human development can be achieved.

Keywords— democracy, human development, modernization theory, HDI, TSCS.

Terrorism and It's Impact on Environment and Human Rights

Fred Charles Iklé, Alistair Horne, Gerard Chaliand, Arnaud Blin

Abstract— Terrorist acts can destabilize Governments, undermine civil society, jeopardize peace and security, threaten social and economic development, and may especially negatively affect certain groups. All of these have a direct impact on the enjoyment of fundamental human rights.

Keywords— the threat or use of violence;, political objective; the desire to change the status quo, the intention to spread fear by committing spectacular public acts, the intentional targeting of civilians.

Retrospective Insight on the Changing Status of the Romanian Language Spoken in the Republic of Moldova

Gina Aurora Necula

Abstract— From its transformation into a taboo and its hiding under the so-called “Moldovan language” or under the euphemistic expression “state language”, to its regained status recognition as an official language, the Romanian language spoken in the Republic of Moldova has undergone impressive reforms in the last 60 years. Meant to erase the awareness of citizens’ ethnic identity and turn a majority language into a minority one, all the laws and regulations issued on the field succeeded into setting numerous barriers for speakers of Romanian. Either manifested as social constraints, or materialized into assumed rejection of mother tongue usage, all these laws have demonstrated their usefulness and major impact on the Romanian-speaking population. This article is the result of our research carried out over 10 years with the support of students, Moldovan citizens, from the master’s degree program “Romanian language - identity and cultural awareness”. We present here a retrospective insight of the reforms, laws and regulations that contributed to the shifted status of the Romanian language from the official language, seen as language of common use both in the public and private spheres, in the minority language that surrendered its privileged place to the Russian language, firstly in the public sphere, and then, slowly but surely, in the private sphere. Our main goal here is to identify and make speakers understand what the barriers to learning Romanian language are nowadays when the social pressure on using Russian no longer exists.

Keywords— linguistic barriers, lingua franca, private sphere, public sphere; reformation.

Linguistic Analysis of Argumentation Structures in Georgian Political Speeches

Mariam Matiashvili

Abstract— Argumentation is an integral part of our daily communications - formal or informal. Argumentative reasoning, techniques, and language tools are used both in personal conversations and in the business environment. Verbalization of the opinions requires the use of extraordinary syntactic-pragmatic structural quantities - arguments that add credibility to the statement. The study of argumentative structures allows us to identify the linguistic features that make the text argumentative. Knowing what elements make up an argumentative text in a particular language helps the users of that language improve their skills. Also, natural language processing (NLP) has become especially relevant recently. In this context, one of the main emphases is on the computational processing of argumentative texts, which will enable the automatic recognition and analysis of large volumes of textual data. The research deals with the linguistic analysis of the argumentative structures of Georgian political speeches - particularly the linguistic structure, characteristics, and functions of the parts of the argumentative text - claims, support, and attack statements. The research aims to describe the linguistic cues that give the sentence a judgmental/controversial character and helps to identify reasoning parts of the argumentative text. The empirical data comes from the Georgian Political Corpus, particularly TV debates. Consequently, the texts are of a dialogical nature, representing a discussion between two or more people (most often between a journalist and a politician). The research uses the following approaches to identify and analyze the argumentative structures Lexical Classification & Analysis - Identify lexical items that are relevant in argumentative texts creating process - Creating the lexicon of argumentation (presents groups of words gathered from a semantic point of view); Grammatical Analysis and Classification - means grammatical analysis of the words and phrases identified based on the arguing lexicon. Argumentation Schemas - Describe and identify the Argumentation Schemes that are most likely used in Georgian Political Speeches. As a final step, we analyzed the relations between the above mentioned components. For example, If an identified argument scheme is “Argument from Analogy”, identified lexical items semantically express analogy too, and they are most likely adverbs in Georgian. As a result, we created the lexicon with the words that play a significant role in creating Georgian argumentative structures. Linguistic analysis has shown that verbs play a crucial role in creating argumentative structures.

Keywords— georgian, argumentation schemas, argumentation structures, argumentation lexicon.

Metacognitive Strategies in Campus Journalistic Texts: Towards the Development of an Instructional Model

Merelyn F. Chen

Abstract— The study qualitatively collected the metacognitive strategies in writing campus journalistic texts among 12 participants in one of the public senior high schools in Quezon City to develop a metacognitive-based instructional design for writing campus journalistic texts. Writing campus journalistic texts may be improved by metacognitive-based instructions because metacognitive strategies bring out the types of cognitive awareness, such as learning about learning and thinking about thinking. Successful campus journalistic texts may be achieved through the use of metacognitive strategies because metacognitive strategies for each stage of writing are linked to the three major regulation components, specifically, planning, monitoring and evaluation. The data was gathered using the self-report questionnaire on Metacognitive Strategies in Writing Campus Journalistic Texts (MSWCJT), focus group discussion sheet, and structured interview questionnaire. Through thematic analysis, it was found that there are 18 metacognitive strategies in writing campus journalistic texts which were collected from 12 participants: 4 in pre-writing, 12 in while writing and 4 in post-writing. It revealed that in pre-writing, majority of the participants think about the goal before writing. Moreover, in while writing, participants focused on the words and phrases that were appropriate and they also thought about grammar. In post-writing, the participants reread the text to make sure of having a clear language. This study proposes the metacognitive strategies from the three stages of the writing process to be used as the framework of metacognitive-based instructional design in teaching writing campus journalistic text.

Keywords— metacognition in learning, metacognitive strategies, writing campus journalistic texts, metacognitive strategies in writing.

Revisiting TEFL in Post COVID 19 Higher Education Era in Morocco

Sakale Sana, Alaoui Hichami Taoufik

Abstract—“Digital Citizenship” stands for “norms of appropriate, responsible behavior with regard to technology use.” (Ribble and Bailey, 2007, 10). It is a varied set of concepts used to communicate, broadcast, store and manage one’s interaction with other people. These concepts include self-knowledge, interaction, and intimate knowledge of a place, its people, and its cultural history. Since the beginning of the Covid 19 pandemic, the challenge of adapting to the new situation has urged the reshaping of different sectors, especially the educational sector. Therefore, the implementation of some digital concepts in this domain, namely “Digital Citizenship”, has become a must to facilitate the teaching-learning process by simplifying the act of sharing and providing educational material. In other words, the combination of print, records, audio, and video technologies motivates the learners, hence making the teaching/learning process smoother and easier. Technology can improve the efficiency and effectiveness of education at all levels in both formal and informal settings, especially in the Third Millennium. Still, some of the main challenges are related to the way teachers, especially in Higher Education, use those technologies for the sake of motivating students, gaining time, disseminating information appropriately, and sensitizing them to the importance of becoming digital citizens. No one can deny that “Digital Citizenship” is of capital importance in the Moroccan higher education system; therefore, media can help effectively reshape people’s perceptions of different global issues. However, this very fact is surrounded by many limitations that hinder the implementation of “Digital Citizenship” concepts in the teaching-learning process such as the erroneous ideas assimilated by media. These limitations are, in fact, very serious and may lead to some long-term negative effects on people’s future careers. To overcome the different problems that are surrounded by “Digital Citizenship”, this paper will present some suggestions that can help in the implementation of “Digital Citizenship” concepts in Moroccan universities in order to have global future generations who are open but vigilant toward sensitive issues.

Keywords—social applied sciences, TEFL, higher education, cultural studies.

Boredom in the Classroom: Sentiment Analysis on Teaching Practices and Related Outcomes

Elisa Santana-Monagas, Juan L. Núñez, Jaime León, Samuel Falcón, Celia Fernández, Rocío P. Solís

Abstract— Students' emotional experiences have been a widely discussed theme among researchers, proving a central role on students' outcomes. Yet, up to now, far too little attention has been paid to teaching practices that negatively relate with students' negative emotions in the higher education. The present work aims to examine the relationship between teachers' teaching practices (i.e., students' evaluations of teaching and autonomy support), the students' feelings of boredom and agentic engagement and motivation in the higher education context. To do so, the present study incorporates one of the most popular tools in natural processing language to address students' evaluations of teaching: sentiment analysis. Whereas most research has focused on the creation of SA models and assessing students' satisfaction regarding teachers and courses to the author's best knowledge, no research before has included results from SA into an explanatory model. A total of 225 university students (Mean age = 26.16, SD = 7.4, 78.7 % women) participated in the study. Students were enrolled in degree and masters' studies at the faculty of Education of a public university of Spain. Data was collected using an online questionnaire students could access through a QR code they completed during a teaching period where the assessed teacher was not present. To assess students' sentiments towards their teachers' teaching, we asked them the following open-ended question: "If you had to explain a peer who doesn't know your teacher how he or she communicates in class, what would you tell them?". Sentiment analysis was performed with Microsoft's pre-trained model. For this study, we relied on the probability of the students answer belonging to the negative category. To assess the reliability of the measure, inter-rater agreement between this NLP tool and one of the researchers, who independently coded all answers, was examined. The average pairwise percent agreement and the Cohen's kappa were calculated with ReCal2. The agreement reached was of 90.8% and Cohen's kappa .68, both considered satisfactory. To test the hypothesis relations a structural equation model (SEM) was estimated. Results showed that the model fit indices displayed a good fit to the data; $\chi^2(134) = 351.129$, $p < .001$, RMSEA = .07, SRMR = .09, TLI = .91, CFI = .92. Specifically, results show that boredom was negatively predicted by autonomy support practices ($\beta = -.47[-.61, -.33]$), whereas for the negative sentiment extracted from SET, this relation was positive ($\beta = .23[.16, .30]$). In other words, when students' opinion towards their instructors' teaching practices was negative, it was more likely for them to feel bored. Regarding the relations among boredom and student outcomes, results showed a negative predictive value of boredom on students' motivation to study ($\beta = -.46[-.63, -.29]$) and agentic engagement ($\beta = -.24[-.33, -.15]$). Altogether, results show a promising future for sentiment analysis techniques in the field of education as they proved the usefulness of this tool when evaluating relations among teaching practices and student outcomes.

Keywords— sentiment analysis, boredom, motivation, agentic engagement.

Establishing Feedback Partnerships in Higher Education: A Discussion of Conceptual Framework and Implementation Strategies

Jessica To

Abstract

Feedback is one of the powerful levers for enhancing students' performance. However, some students are under-engaged with feedback because they lack responsibility for feedback uptake. To resolve this conundrum, recent literature proposes feedback partnerships in which students and teachers share power and responsibilities to co-construct feedback. During feedback co-construction, students express feedback needs to teachers, and teachers respond to individuals' needs in return. Though this approach can increase students' feedback ownership, its application is lagging as the field lacks conceptual clarity and implementation guide. This presentation aims to discuss the conceptual framework of feedback partnerships and feedback co-construction strategies. It identifies the components of feedback partnerships and strategies which could facilitate feedback co-construction.

A systematic literature review was conducted to answer the questions. The literature search was performed using ERIC, PsycINFO and Google Scholar with the keywords "assessment partnership", "student as partner" and "feedback engagement". No time limit was set for the search. The inclusion criteria encompassed (i) student-teacher partnerships in feedback, (ii) feedback engagement in higher education, (iii) peer-reviewed publications and (iv) English as language of publication. Those without addressing conceptual understanding and implementation strategies were excluded. Finally, 65 publications were identified and analysed using thematic analysis. For procedure, the texts relating to the questions were first extracted. Then, codes were assigned to summarise the ideas of the texts. Upon subsuming similar codes into themes, four themes emerged: students' responsibilities, teachers' responsibilities, conditions for partnerships development and strategies. Their interrelationships were examined iteratively for framework development.

Establishing feedback partnerships required different responsibilities of students and teachers during feedback co-construction. Students needed to self-evaluate performance against task criteria, identify inadequacies and communicate their needs to teachers. During feedback exchanges, they interpreted teachers' comments, generated self-feedback through reflection and co-developed improvement plans with teachers. Teachers had to increase students' understanding of criteria and evaluation skills and create opportunities for students' expression of feedback needs. In feedback dialogue, teachers responded to students' needs and advised on the improvement plans. Feedback partnerships would be best grounded in an environment with trust and psychological safety.

Four strategies could facilitate feedback co-construction. First, students' understanding of task criteria could be increased by rubrics explanation and exemplar analysis. Second, students could sharpen evaluation skills if they participated in peer review and received teacher feedback on the quality of peer feedback. Third, provision of self-evaluation checklists and prompts and teacher modeling of self-assessment process could aid students in articulating feedback needs. Fourth, trust could be fostered when teachers explained the benefits of feedback co-construction, showed empathy and provided personalised comments in dialogue. Some strategies were applied in interactive cover sheets in which students performed self-evaluation and made feedback requests on a cover sheet during assignment submission, followed by teachers' response to individuals' requests.

The significance of this presentation lies in unpacking the conceptual framework of feedback partnerships and outlining feedback co-construction strategies. With a solid foundation in theory and practice, researchers and teachers could better enhance students' engagement with feedback.

Keywords

Conceptual framework, feedback co-construction, feedback partnerships, implementation strategies.

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Sentiment Analysis on University Students' Evaluation of Teaching and Their Emotional Engagement

Elisa Santana-Monagas, Juan L. Núñez, Jaime León, Samuel Falcón, Celia Fernández, Rocío P. Solís

Abstract— Teaching practices have been widely studied in relation to students' outcomes, positioning themselves as one of their strongest catalysts and influencing students' emotional experiences. In the higher education context, teachers become even more crucial as many students ground their decisions on which courses to enroll in based on opinions and ratings of teachers from other students. Unfortunately, sometimes universities do not provide the personal, social, and academic stimulation students demand to be actively engaged. To evaluate their teachers, universities often rely on students' evaluations of teaching (SET) collected via Likert scale surveys. Despite its usefulness, such a method has been questioned in terms of validity and reliability. Alternatively, researchers can rely on qualitative answers to open-ended questions. However, the unstructured nature of the answers and a large amount of information obtained requires an overwhelming amount of work. The present work presents an alternative approach to analyse such data: sentiment analysis. To the best of our knowledge, no research before has included results from SA into an explanatory model to test how students' sentiments affect their emotional engagement in class.

The sample of the present study included a total of 225 university students (Mean age = 26.16, SD = 7.4, 78.7 % women) from the Educational Sciences faculty of a public university in Spain. Data collection took place during the academic year 2021-2022. Students accessed an online questionnaire using a QR code. They were asked to answer the following open-ended question: "If you had to explain to a peer who doesn't know your teacher how he or she communicates in class, what would you tell them?". Sentiment analysis was performed using Microsoft's pre-trained model. The reliability of the measure was estimated between the tool and one of the researchers who coded all answers independently. The Cohen's kappa and the average pairwise percent agreement were estimated with ReCal2. Cohen's kappa was .68, and the agreement reached was 90.8%, both considered satisfactory. To test the hypothesis relations among SA and students' emotional engagement, a structural equation model (SEM) was estimated. Results demonstrated a good fit of the data: RMSEA = .04, SRMR = .03, TLI = .99, CFI = .99. Specifically, the results showed that student's sentiment regarding their teachers' teaching positively predicted their emotional engagement ($\beta = .16$ [.02, .30]). In other words, when students' opinion toward their instructors' teaching practices is positive, it is more likely for students to engage emotionally in the subject. Altogether, the results show a promising future for sentiment analysis techniques in the field of education. They suggest the usefulness of this tool when evaluating relations among teaching practices and student outcomes.

Keywords— sentiment analysis, students' evaluation of teaching, structural-equation modelling, emotional engagement.

A Comparative Study of Automotive / Transportation Design Programs and University: Industry Cooperation Models in Higher Education

Efe Çukur

Abstract— This study aims to discuss and compare i) widespread and generic design, particularly industrial design education in relation to the specific needs of the automotive/transportation industry, and ii) an automotive/transportation design education model within and under to provide the conditions of design education and automotive industry, especially in Turkey and T.R.N.C. The automotive industry is the 11th largest in the world (\$1.51 trillion). One of the most important departments in this industry, along with sales, marketing and engineering, is the design department. The automotive industry is known as the locomotive industry, but there is a non-automotive design department on the academic side of Turkey. This suggestion; includes the presentation of a program proposal that meets the needs of the industry for Turkey and T.R.N.C., the second largest automobile manufacturing country in Europe.

On the education side, industrial design education has become a generic title. Automotive design studios are divided into several subgroups. Even in the higher graduate education, the automotive design departments get their subgroups like exterior design and interior design. Transportation design, which is a subfield of industrial design, is offered as higher education in transportation design departments, particularly in America and Europe. In these departments, the curriculum is shaped to the needs of the sectors. Higher education transportation design programs began in the mid-20th century. Until those high education programs...Until these high education programs, the industry has adapted architectures and engineers for designer workloads. Still today transportation design graduates are not the majority of the design studios. The content of the study is an in-depth comparison of these institutions and how the requirements, demands of the industry are met in this regard and revealed. Some of the institutions are selected from Europe and US. To be analyzed under the headings of staff, courses, syllabus, University-Industry collaboration, and location selection. The study includes short, mid, and long term proposals and a hypothesis for discussion. In short, the study will not only provide a wide comparative scope of information on generic and specialized aspects of design education in different countries but also propose a higher education model for automotive / transportation design with solid data of requirements, methodology, and structure regarding learning outcomes, and especially industry cooperation.

Keywords— design education, automotive - transportation design programs, transportation design, automotive industry in Turkey/T.R.N.C., automotive design education in Turkey/T.R.N.C.

The Learning Styles Approach to Math Instruction: Improving Math Achievement and Motivation among Low Achievers in Kuwaiti Elementary Schools

Eisa M. Al-Balhan, Mamdouh M. Soliman

Abstract— This study introduced learning styles techniques into mathematics teaching to improve mathematics achievement and motivation among Kuwaiti fourth- and fifth-grade low achievers. The study consisted of two groups. The control group (N = 212) received traditional math tutoring based on a textbook and the tutor's knowledge of math. The experimental group (N = 209) received math tutoring from instructors trained in the Learning Style™ approach. Three instruments were used: Motivation Scale towards Mathematics; Achievement in Mathematics Test; and the manual of learning style approach indicating the individual's preferred learning style: AKV, AVK, KAV, KVA, VAK, or VKA. The participating teachers taught to the detected learning style of each student or group. The findings show significant improvement in achievement and motivation towards mathematics in the experimental group. The outcome offers information to variables affecting achievement and motivation towards mathematics and demonstrates the leading role of Kuwait in education within the region.

Keywords— elementary school, learning style, math low achievers, SmartWired™, math instruction, motivation.

How did the Migration Policies of the European Union Take Shape in the Post-Migration Crisis Period of 2015? How did the Russian-Ukrainian War Affect This Situation?

Sedef Koyun

Abstract— The migration crisis is one of today's problems, and this problem has directly affected the European Union. After the Syrian civil war that started in 2010, the migration crisis in 2015 affected Europe in every way. And with the Russia-Ukraine war that is taking place today, the problem of Ukrainian immigrants has also emerged. This study deals with the policies of the European Union after the 2015 migration crisis. It gives information about the anti-immigration attitude and changing immigration policies in the European Union. In addition, the effect of the Ukraine-Russia war on the immigration policies of the European Union is shown. In addition, the rights granted to Muslim immigrants and other ethnic immigrants in Europe were compared. In this article, the qualitative method is used, and the concepts are explained. And graphs and tables are included in order to compare the number of immigrants. As a result, a change has been observed in the European Union immigration policies before and after 2015. The European Union has developed immigration policies that defend both the rights of immigrants and the rights of its own people.

Keywords— migrant crisis, EU migrant policy, Russian-Ukraine war, migrant issue.

The Multiple Sclerosis Condition and the Role of Varicella-Zoster Virus in Its Progression

Sina Mahdavi, Mahdi Asghari Ozma

Abstract— Multiple sclerosis (MS) is the most common inflammatory autoimmune disease of the CNS that affects the myelination process in the central nervous system (CNS). Complex interactions of various "environmental or infectious" factors may act as triggers in autoimmunity and disease progression. The association between viral infections, especially human Varicella-zoster virus (VZV) and MS is one potential cause that is not well understood. This study aims to summarize the available data on VZV retrovirus infection in MS disease progression. For this study, the keywords "Multiple sclerosis", " Human Varicella-zoster virus ", and "central nervous system" in the databases PubMed, Google Scholar, Sid, and MagIran between 2016 and 2022 were searched and 14 articles were chosen, studied, and analyzed. Analysis of the amino acid sequences of HNRNPA1 with VZV proteins has shown a 62% amino acid sequence similarity between VZV gE and the PrLD/M9 epitope region (TNPO1 binding domain) of mutant HNRNPA1. A heterogeneous nuclear ribonucleoprotein (hnRNP), which is produced by HNRNPA1, is involved in the processing and transfer of mRNA and pre-mRNA. Mutant HNRNPA1 mimics gE of VZV as an antigen that leads to autoantibody production. Mutant HnRNPA1 translocates to the cytoplasm, after aggregation is presented by MHC class I, followed by CD8 + cells. Of these, antibodies and immune cells against the gE epitopes of VZV remain due to the memory immune response, causing neurodegeneration and the development of MS in genetically predisposed individuals. VZV expression during the course of MS is present in genetically predisposed individuals with HNRNPA1 mutation, suggesting a link between VZV and MS, and that this virus may play a role in the development of MS by inducing an inflammatory state. Therefore, measures to modulate VZV expression may be effective in reducing inflammatory processes in demyelinated areas of MS patients in genetically predisposed individuals.

Keywords— multiple sclerosis, varicella-zoster virus, central nervous system, autoimmunity.

Staphylococcus Aureus (T267) Isolated from Bovines' Mastitis Clinical Cases in Oran, Algeria, Influencing Bacterial Contamination in the Milk Quality

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Abstract—

Background and aim: In a healthy state, the secretion of milk produced in the cow's udder is sterile, is free from germs and pathogens or not. There is no normal flora in cow's milk, and the presence of bacteria in the bovine milk collected is abnormal. The presence of pathogens and germs is typically a sign of an infection of the gland. *S. aureus* mastitis is considered one of the major diseases in dairy cattle and influences bacterial contamination in the milk quality. This present study determines the phylogenetic profile of *S. aureus* isolated from milk samples of Bovines mastitis in Oran.

Methods: The tools used as MALDI-TOF, spa, MLST for phylogenic characterization, and the molecular profile toxic was demonstrated by PCR.

Results: Antibiotic resistance of *S. aureus* and confirmed by amplification of the *mecA* gene. Results of spa typing, variety (T267, T021, and t007). MLST; reveals different (ST39, ST2598 and ST97). Toxin research shows that only some strains proved carriers of different virulence genes, PVL gene. Other strains were positive for the TST gene (TSST-1); 100% of the *S. aureus* isolates identified were SASM. This work has determined the phylogenetic profile, toxic, and sensitivity profile of méticiline strains selected in the study.

Conclusion: Analysis showed that all strains found as PVL are sensitive to methicillin, don't belong to ST30 commonly found in humans in Oran, relation to the type of stem ST97 is of bovine origin.

Keywords: milk, quality, mastitis, *S. aureus*, spa typing, MLST, pvl, mecA, tsst.

Reaction of Nine Candidate Wheat Lines/Mutants against Leaf Rust, Lodging and Aphid Population under Field Condition

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Abstract: Brown Rust (*Puccinia triticina*) also known as leaf rust, pose a serious threat to wheat cultivation in world. Nine candidate wheat lines/mutants were subjected to rust inoculation, lodging and aphid population in vivo condition. Four lines/mutants (E-284, E-505, 2008-6 MR and 2008-14MR) were found resistant against leaf rust attack. Two lines (PGMB 15-29 and 2011-1 MR) displayed moderately resistant reaction against the disease. Three lines/mutants were depicted as susceptible against leaf rust. Lowest population of aphid *i.e.* 16.67 was observed on 2008-14MR. Three lines/mutants (NN1-47, NN1-89 and PGMB 15-29) were found under zero level of lodging. Presence and absence of different leaf rust resistant genes like Lr13, Lr34, Lr46 and Lr67 were assessed with the help of molecular markers. All the wheat lines/mutants were found loaded with leaf rust resistant genes such as Lr13 and Lr 34 while Lr46 and Lr67 were found in 66% wheat lines/mutants. The resistant source can be exploited in breeding program to develop rust, aphid and lodging with race-nonspecific resistant wheat variety.

Keywords: wheat, leaf rust, lodging, aphid, reaction

INTRODUCTION. Among cereals, wheat occupied an important position and its flour is used to make chapatti that is relished by people of Pakistan. Many pathogens attack wheat crop that reduce its yield. Among fungal pathogens, rusts are notorious and damage wheat crop badly under conducive environment. (Rattu *et al.*, 2011; Qamar *et al.* 2014). Yellow /stripe rust appear under low and humid environmental conditions. Stem rust requires hot and humid conditions, while leaf/brown rust requires higher temperature than yellow rust but lower than stem rust. (Singh *et al.*, 2005; Afzal *et al.*, 2008; Ibrahim *et al.* 2013). Brown rust (leaf rust) is a major constraint to wheat crop that curtail yield losses up to 50 % (McIntosh *et al.*, 1995). India and Pakistan are major wheat producing countries in Asia and rust is one of main factors that curtail wheat yield in both countries. (Singh *et al.* 2004). Rusts appear many times in epidemic form in many parts of South Asia that indicate its importance in this region. (Hassan, 1979; Hussain *et al.*, 1980). Pakistani breeders have developed many disease resistant and high yielding wheat varieties that are being cultivated in many parts of the country. However, rust pathogen has overcome many resistant varieties due to its ability to change its genetic makeup rapidly. Lodging is also a major yield limiting factor to wheat crop worldwide. Lodging not only makes harvesting of wheat crop difficult but also invites many fungus pathogens that deteriorate its quality. Attack of aphid on wheat crop is increasing day by day in Pakistan and farmers are

considering insecticidal spray as a quick method for the timely management of this disease (Anonymous, 2011). At early stage of wheat growth, high attack of aphid can cause the death of wheat plant, but due to low aphid population and feeding growth of wheat is stunted and tiller numbers as well as grain yield is reduced (Russell, 2013). Heavy infestation of wheat aphid has direct effect on nitrogen and protein contents, thousand grain weight, grain per spike and total chlorophyll content as a result of which biomass is reduced (Ciepiela, 1993) wheat aphid can cause 35-40% yield losses and also transmit viral and fungal diseases (Trdan and Milevoj, 1999; Kieckhefer and Gellner, 1992; Girma *et al.*, 1993). Different methods such as cultural, biological and chemical are being used to control wheat aphid (Hatchett *et al.*, 1987). Resistance is very important as it is environmentally safe approach and keep aphid population below economic threshold level. But under high infestation chemical spray is good option to check aphid population (Newsom, 1980; Lowe, 1987). For the management of leaf rust (brown rust) resistant genes are being deployed in wheat breeding program as rust mutates at alarming rate, therefore race non-specific genes such as Lr34, Lr46, Lr 67 and Lr67 are considered good option to tackle this notorious pathogen.

Materials and Methods: Nine (09) candidate wheat lines/mutants were evaluated for resistance against leaf rust, aphid and lodging under field condition at National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad, Pakistan during 2017-2018. The trial was carried out under Randomized Complete Design (RCBD) with Row to Row (R x R) distance of 30 cm. Artificial rust inoculation was carried out during January to February 2018 with the leaf rust inoculum collected from Ayub Agricultural Research Institute, Faisalabad. Inoculation of leaf rust was also carried out on susceptible check Morocco. Data of disease severity was recorded according to disease rating scale developed by Loegering (1959). The severity of disease was assessed by using modified Cobb scale (Peterson *et al.*, 1948). Two bags of urea, two bags of DAP fertilizer were applying to maintain good crop condition. Four irrigations were applied and weedicides were also sprayed for the management of weeds in wheat crop. Inoculation of spreader was carried out by spraying inoculum, two to three drops of Tween-20 were also added to inoculum (Rehman, 2006). Wheat crop was sprayed regularly twice a day with water to maintain humid condition as it is necessary for the development of disease. (Rowell, 1948).

Calculation for ACI and RRI. The Coefficient of Infection (CI) for leaf rust was calculated according to method developed by Akhtar *et al.*, 2002. The severity of the disease was multiplied with response value for the estimation of Coefficient infection. The highest disease severity was considered as benchmark and remaining values were adjusted accordingly as shown in formula. While 0 denotes most susceptible and 9 denote highly resistant (Akhtar *et al.*, 2002). The RRI was calculated according to the following formula:

$$RRI = 90 - (CI \text{ of given line}) \times 9$$

90

Plant height was measured for each wheat line by selecting five plants from each plot with the help of scale. Number of grains per spike counted by threshing spike of each wheat line manually. Thousand grains were counted with the help of seed counter Compteur De Grams Chopin Technologies and weighed with weighing balance (VWR, Italy). Grain quality parameters such as protein content, moisture, gluten and zelenyl were analyzed with Omega Analyzer G Bruins Instrument.

Estimation of lodging: - Estimation of lodging was assessed under field condition by adopting the protocol given by Liyuan Niu *et al* 2016. The different levels of lodging with description are given below

Level 1: zero lodging

Level 2: minimum lodging. 20% area lodged

Level 3: intermediate lodging. 20-40% area lodged

Level 4: immense lodging. 40-80% area lodged

Level 5: severe lodging. More than 80% area lodged

DNA extraction and quantification: seeds of 9 Wheat lines/mutants were sown in plastic cups having parts peat and one part clay soil. They were incubated at 25°C for 10-15 days under Lab condition. Genomic DNA was extracted from 10-14 days old seedlings following the CTAB method. DNA quantification was carried out using Nanodrop 2000 (spectrophotometer thermo Scientific, USA) and normalized to ~20 ng/ μ L for each sample.

Detection of Lr Genes by Molecular Markers. 4 μ l of DNA was added to each PCR tube. Master mixture was prepared by adding 43 μ l D3, 64 μ l DNTPs, 30 μ l buffers, 30 μ l mgcl₂, 40 μ l primer and 3 μ l Taq polymerase. Then 21 μ l was taken from master mixture and added to PCR tubes. Amplifications were performed in C1000 Touch Thermol Cycler with initial temperature 95C, cycles 35, and extension temperature 72C at 120 volt using an electrophoresis unit (SCIE-PLAS). Amplified products were separated with 2.4% agarose gel (thermoscientific topvision, Lithuania) and observed under UV light. .

2.5. Electrophoresis

Results: As shown in table 1 that lowest disease severity (7.33) was recorded in wheat line 2008-14 MR, followed by mutant E 505 which showed disease severity percentage of 10. Highest disease severity was observed in NN1-89. NN1-47 was also depicted as susceptible as 71.67% disease was observed. 2011-1MR and PGMB 15-29 were categorized as moderately susceptible with disease percentage of 22.33 20.33 respectively. E-749 behaves as susceptible with disease severity percentage of 65. A wide range of aphid population was observed in wheat lines/mutants. Lowest population of aphid (16.67) was calculated in wheat lines 2008-14 MR. NN1-47 and E-749 were statistically at par with aphid population of 19 and 19.66 respectively. Wheat lines 2008-6 MR also showed aphid population of 20. 2011-1MR and NN1-89 showed aphid population frequency of 24 and 24.33 respectively. Three wheat lines/mutants E-505, E.284 and PGMB 15-29 were at par with aphid population of 36.33, 32.33 and 35.66 respectively. No lodging was observed in three wheat lines i.e. NN1-47, NN1-89 and PGMB 15-29, these lines were categorized under level 0 according to rating scale. Highest lodging (45%) was noted in line 2011-1MR followed by 2008-14MR (35%). E-749 and 2008-6MR reacted similarly to lodging under field condition. E-284 was found under level 2 with lodging percentage of 13.67.

Table 1: Disease severity, Reaction, Response value, Co-efficient of infection (CI) and Relative resistant index (RRI) of different candidate lines/mutants

Wheat line/mutant	Disease Sev. %	Reaction	Response value	CI	RRI
NN1-47	71.67B	S	1	76.67	1.83
NNI-89	90A	S	1	90	0
E-284	11.67D	R	.2	2.33	8.76
PGMB15-29	20.33C	MR	.4	8.13	8.18
E-749	65B	S	1	65	2.49
E 505	10D	R	.2	2	8.79
2008-6MR	11.33D	R	.2	2.26	8.77
2008-14MR	7.33D	R	.2	1.46	8.85
2011-1MR	22.33C	MR	.4	8.93	8.10
CV	13.45				

Table 2: Aphid population and Lodging level of different candidate lines/mutants

Wheat line/mutant	Aphid population	Lodging % with level
NN1-47	19BC	0 Level 1
NNI-89	24.33B	0 level 1
E-284	32.33A	13.67D level 2
PGMB15-29	35.66A	0 level 1
E-749	19.66BC	23.33C level 3
E 505	36.33A	.67E level 1
2008-6MR	20BC	24C level 3
2008-14MR	16.67C	35 B level 3
2011-1MR	24 BC	45A level 4
CV	16.73	21.60

Highest protein contents (15%) were recorded in wheat line ghandum-5 followed by 13.5 % in line 200814MR which showed resistant response under field condition. Lowest protein contents (12%) were found in line 2008-6MR. gluten contents were in the range of 37-42 with highest in Ghandum-5 (42) and lowest in line 2008-6MR (37). Zelenyl contents were slightly different in each wheat line with highest (73) in wheat line 2008-14MR and lowest in three wheat lines *i.e* E-284, NN1-47, 2008-6MR and NN1-89 with value of 70 in each. Maximum plant height *i.e* 95.6 cm was found of wheat line 2008-14-1 and lowest (64.2) was recorded in wheat line NN1-89. Number of grains per spike were highest (46.8) in wheat line 2008-14-1MR and lowest (30.6) in NN1-89. Thousand grain weights were positively correlated with resistant level of wheat line. Highest TGW (35g) was calculated in wheat line E-505 and minimum (25g) was recorded in NN1-89. Nine wheat lines/mutants (NN1-47, NN1-89, E-284, PGMB 15-29, E-749, E-505, 2008-6 MR, 2008-14MR and 2011-1MR) were evaluated with the help of markers for four leaf rust resistant genes such as 13, 34, 46 and 67 (Figure 1). The detail of markers used in this study is given in Table 3.all tested lines/mutants were found positive for Lr13 and Lr34 genes. Lr46 was identified in 67% of cultivars. Lr67 get same presence as of Lr46.

Table 3: Primer sequence and size of amplified marker used in this study

Lr gene	Sequence of primers	Size of amplified marker fragment (bp)
13	GTGCCTGTGCCATCGTC CGAAAGTAACAGCGCAGTGA	324
34	GTGAAGCAGACCCAGAACAC GACGGCTGCGACGTAGAG	253
46	GGTCTTCTGGGCTTTGATCCTG GTTGCTAGGGACCCGTAGTGG	242
67	CAA TAA GTA GGC CGG GAC AA TGT GCC AGT TGA GTT TGC TC	214

Table: 4 shows the presence and absence of different leaf rust genes

Wheat line/mutant	Lr-13	Lr-34	Lr-46	Lr-67
NN1-47	+	+	-	-
NN1-89	+	+	-	-
E-284	+	+	+	+
PGMB15-29	+	+	+	+
E-749	+	+	-	-

E-505	+	+	+	+
2008-6MR	+	+	+	+
2008-14MR	+	+	+	+
2011-1MR	+	+	+	+

+ Sign show the presence of relevant gene

- Sign show the absence of relevant gene

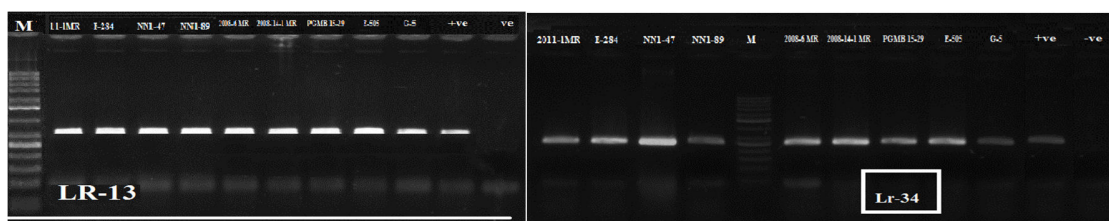


Fig 1: PCR amplified product for detecting Genes Lr13 and Lr34

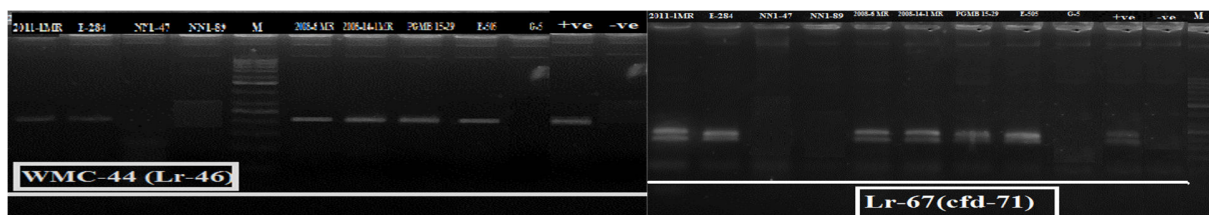


Fig 2: PCR amplified product for detecting Genes Lr46 and Lr67

Discussion:

In Pakistan leaf rust is a major threat to wheat yield. Many high yielding wheat varieties are susceptible to leaf rust pathogen. Sehar 2006, a high yields wheat variety losses resistances against leaf rust. The only possible way to avert the losses caused by leaf rust pathogen is sowing of resistant cultivars. The resistant source may be found by subjecting wheat lines to rust inoculum under field condition. Mutant’s lines also provide good source of resistant against the rust disease. The main purpose of present research work was to come up with resistant source against rust pathogen. High yielding selected as well as mutants lines were subjected to artificial inoculation of leaf rust pathogen under field conditions. Less disease severity was observed on mutant’s lines which are according to research work of Saber, 1998. They observed less disease severity on Gamma treated two wheat mutants. Our results also substantiate the findings of Jackie et al, 2012. They conducted research in 2012 against all types of wheat rust against mutants and observed less disease severity. Our findings also support the result of Lesley et al 2001. They screened seven wheat mutants against tallow rust pathogen and found three mutants with reduces level of disease severity. Our results also support the findings of MINA

TALAJOOR *et al* 2016, they found that mutation induced by ethyl methane sulphonate (EMS) enhanced resistance to brown rust diseases. Momina *et al* also conducted research on wheat mutants and they used .8% EMS treated wheat mutants against leaf and yellow rust pathogen. Their study showed that, .91% and 0.55% plants had absolute resistance to leaf and yellow rust, respectively. The outcome of Momna research also matches our findings.

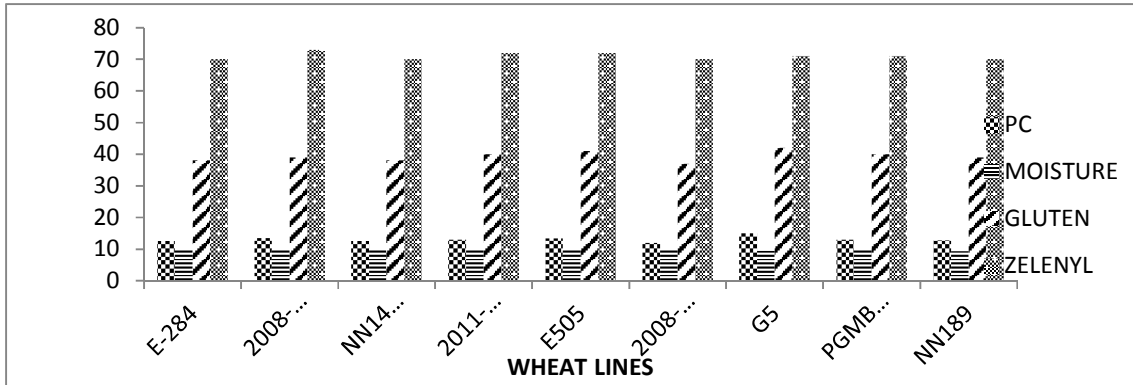


Fig 3: grain quality parameters of different wheat lines/mutants

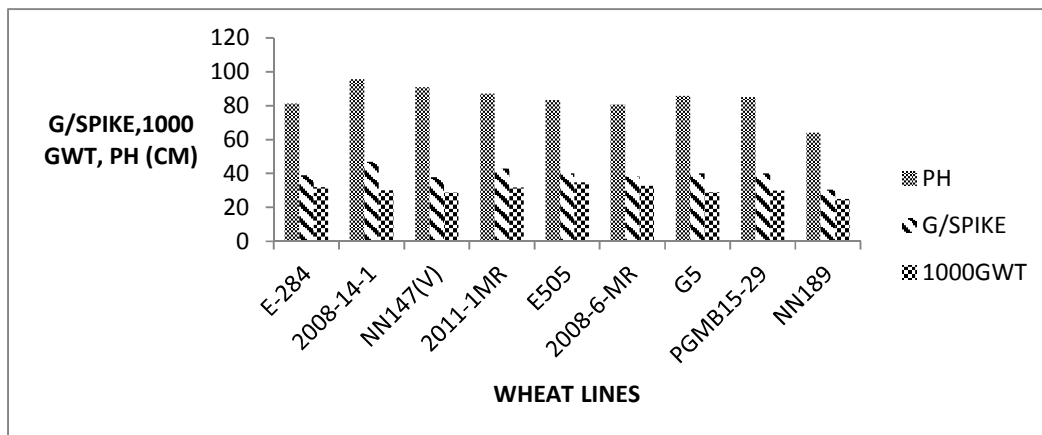


Fig 4: plant height (PH), grain per spike (G/spike), 1000 grain weight (1000GWT) of different wheat lines/mutants

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Resistance Status of 45 Wheat Lines/Mutants Against Yellow /Stripe Rust Under Field Condition

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Abstract: yellow/ stripe rust is a devastating disease of wheat in Pakistan. It causes colossal losses to yield when appear in epidemic form. The most economical and environment friendly approach is cultivation of resistant variety to curtail severity of the disease. In present study 49 wheat lines/mutants developed at National Institute for Biotechnology and Genetic Engineering (NIBGE) were assessed for their genetic potential against the disease under field condition. Four lines (PGMB-27, 2008-1MR, NW 3-11, and CIMMYT-126) displayed resistant reaction against yellow/stripe rust disease. Two lines (2008-14 MR and 2011-11 MR) showed resistant response against the disease. Four lines/mutants (NW 275-2, M8 NN1-239, P-366 waxy and P-970 waxy) exhibited moderately resistant reaction against the yellow rust pathogen. Seven lines/mutants (2008-12, 2008-14-1, 2008-2-2, M8NN1-212, P-989 waxy, M8 NN1-285 and CIMMYT 129) showed moderately susceptible reaction while 2 lines (2012-36, and 2012-117) proved susceptible against yellow/stripe rust disease under field condition. Twenty seven lines/mutants (NNI-89, E-504, NW-167, 2011-2MR, 2011-3, 2012-113, M8NN1-1251, M8NN1-362, M8NN1-409, M8NN1-459, P-219 WAXY, P-1108 WAXY, M8P-1818, P-1839, P-2149, P-2256, P-2513, P-2556, P-2557, P-2764, P-2796, E-24, E-32, CIMMYT 145, P-196 WAXY and GANDUM-5) found highly susceptible against yellow/stripe rust disease under field condition. Data related to others parameters like yield, days to flowering and grain quality parameters were also collected. High yielding rust resistant wheat lines/mutants can be utilized in breeding program to develop rust resistant variety.

Keywords: wheat, yellow rust, resistant, susceptible, mutants

INTRODUCTION: Wheat (*Triticum aestivum* L) is considered as one of the most important cereal crops in world and staple food of people of Pakistan. Protein and fiber are important ingredients of wheat (Rajaram, 2001). The increase in yield of wheat is pre-requisite as world population is expected to cross almost 9 billion in 2050 (FAO, 2013). The frequency of people affected by hunger is on rise due to global warming. Therefore, production of food has to be increased by 70 percent by 2050 to fulfill the demands of people (Semenov et al., 2009). The climatic changes invite the plant diseases that decrease the crop yield (Sanchez, 2019). The per acre yield of wheat in Pakistan is less as compared to other advanced countries due to various biotic and abiotic factors. Among biotic stresses, stripe rust (yellow rust), caused by *Puccinia striiformis* is a devastating disease of wheat crop. Yield losses may reach up to 80 % in epidemic condition (Kolmer, 1996; Beard et al., 2007). Severe infection causes shriveling of grains, kernels per spike reduction as well as thousand grain weight decrease.

Resistant variety is an important component of breeding program and environmentally safe approach to combat the rust pathogen. The resistant source not only curtails the impact of disease but also reduce the cost incurred on using fungicides to manage the rust diseases. To fight against rust pathogen is a continuous struggle as pathogen mutates rapidly to overcome the resistance. Many resistant varieties that were cultivated on large scales in Pakistan are now having lost resistant. Therefore we have to find out resistant source on continuous basis for the management of the rust diseases. Inqalab-91 a leading Pakistani variety was found susceptible to yellow rust. Similarly Sehar-2006, Galaxy-13 and NN-Gandum-1 have lost resistant to yellow rust. 10-70% yield losses have reported due to yellow rust attack (Chen, 2005; Ashmawy and Ragab, 2016), but, 100% yield losses have been reported if disease occur at early growth stage and continue to develop during growing season (Afzal et al., 2007). Fungicidal spray for the management of rust disease can be effective to some extent but cost of production is increased (Yang and Daqun, 2004). Uptill now, more than 75 resistant genes for yellow rust have been identified including the recently mapped Yr 79 (Feng et al., 2018) and Yr 80 (Nsabiyera et al., 2018), and 67 stripe rust resistance genes have been temporarily designated, including race specific as well as race non-specific (Wang and Chen, 2017). Race non-specific resistant genes are more reliable than race specific as they are effective against all races of rust fungi. Therefore, inclusion of race non-specific resistant genes is of utmost importance in breeding program of wheat (Kankwatsa et al., 2017; Yuan et al., 2018). The resistant varieties packed with race non-specific (adult plant) resistant genes remain effective over a long period of time (Khan and Saini, 2009). Resistant wheat germplasm to rust diseases enables the plant breeder to identify broadly adapted genotypes that offer stable performance across a wide range of sites, as well as under specific conditions such as high disease pressure (Yan and Tinker, 2005). This could aid in the development of an optimum breeding strategy for releasing varieties adapted to a target environment (Ahmad et al., 1996). Consequently, the development of resistant varieties will reduce the cost of production and frequency of serious epidemics; this will enhance wheat production in Pakistan and other countries. The objectives of this study were to evaluate 49 Pakistani wheat genotypes/mutants for yellow rust resistance at adult plant stage under artificial epiphytotic conditions and therefore, the resistance genotypes can be used for further manipulation in the wheat breeding program by incorporation into adapted cultivars to assess the variability to yellow rust resistance.

MATERIALS AND METHODS: Forty five (45) candidate wheat lines/mutants were evaluated for resistance against yellow rust disease under field condition at National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad, Pakistan during 2018-2019 cropping season. The trial was run under Randomized Complete Design (RCBD) with Row to Row (R x R) distance of 30 cm. Artificial rust inoculation was carried out during January to February 2018 with the yellow rust inoculum collected from Ayub Agricultural Research Institute, Faisalabad. Inoculation of yellow rust was also carried out on susceptible check Morocco. Data of disease severity was recorded according to disease rating scale develop by Loegering (1959). The severity was recorded as percent of rust infection on the plants according to the modified Cobb scale (Peterson *et al.*, 1948). Two bags of urea, two bags of DAP fertilizer were applying to maintain good crop condition. Four irrigations were applied and weedicides were also sprayed for the management of weeds in wheat crop. Inoculation of spreader was carried out by spraying inoculum; two to three drops of Tween-20 were also added to inoculum (Rehman, 2006). Wheat crop was sprayed regularly twice a day with water to maintain humid condition as it is necessary for the development of disease. (Rowell, 1948).

Disease observation. The disease severity was recorded according to the method given by Loegering (1959), Hussain (1992) and Paterson *et al*, (1948). The severity is the area of tissue infected and it is ranged from 1 to 100%

ANALYSIS OF PROTEIN, MOISTURE, GLUTEN AND ZELENYL. Wheat grains were cleaned from residual straw, spelt, spelt kernels etc. about half kg wheat grains were put in omeg Analyzer (BRUINS INSTRUMENTS) for analysis of protein, moisture, gluten and zelenyl. Standard protocol was adopted for analysis.

Genotype	D.to mature	PC	moisture	GLUTEN	ZELENYL	d.s	reaction	yieldkg/hect
NNI-89	88.33qr	13.76lmnopqr	10.73cdefghi	40.33efgh	72.00IJK	75.33def	HS	32.26
PGMB27	90.00op	14.36fghijklmn	11.67ab	42.33bcd	61.00O	3.33s	HR	5243.33
504	101.33a	13.70mnopqr	10.43defghijk	41defg	76.00DEFG	85.33abc	HS	3226.67
2008-1MR	87.67r	15.00abcdefg	10.46defghijkl	40.67efgh	80.67ABC	5rs	HR	3065.33
2008-12	95.00fg	15.70a	9.66k	41.33def	81.00ab	38ij	MS	2420
2008-14MR	94.33ghi	13.90klmnopqr	11.10bcde	40.67efgh	76.33def	6.67rs	R	3307.33
2008-14-1	94.33ghi	14.26hijklmnop	10.26defghijk	41defg	71.000jkl	28.33lmn	MS	3226.67
2/2/2008	93.33ijk	14.76bcdefghilk	11.06bcdef	41defg	76.33def	30klm	MS	2420
NW-167	93jkl	15.33ab	11.46abc	42.33bcd	81ab	71.67fgh	HS	1613.33
NW-275-2	91.33n	15.50ab	10.20fghijk	44.33a	82.00a	11.67qr	MR	2420
2011-2MR	99.00b	14.46efghijklm	10.30defghijk	40.33efgh	76.00defg	72.33fgh	HS	4840
2011-3	94ghit	14.30hijklmnop	10.60cdefghij	40.67efgh	72.33ijkl	76.67def	HS	4033.33
2011-11MR	91no	14.13hijklmnopq	10.66cdefghij	41defg	69.33lm	5.67rs	R	3226.67
2012-36	97.67cd	15.33abcde	9.90ijk	40.33efgh	75.66defgh	45i	S	4033.33
2012-113	85.00s	13.43pqrs	10.66cdefghij	44.33a	62.33o	75efg	HS	3630
2012-117	88qr	14.03jklmnopq	10.63cdefghuj	39.66ghij	71.00jkl	45i	S	3226.67
NW-3-11	90op	14.33ghijklmno	10.76cdefghi	38.66ijk	71.00jkl	5rs	HR	3549.33
CIMMYT-126	93.67hijk	15.23abcdef	9.93hijk	42.33bcd	80.33abc	5rs	HR	3226.67
M8 NN-1 1251	97.67cd	13.56nopqrs	9.93hijk	40.33efgh	70.67jkl	72.33fgh	HS	3226.67
M8 NN-1 212	94.67fgh	13.06rs	10.80bcdefgh	38.33jk	69.33lm	36.67jk	MS	3226.67
M8 NN-1 239	99.00b	15.20abcdefg	10.56defghij	43.33ab	77.66cde	18.33opq	MR	3226.67
M8 NN-1 362	97.00d	14.10ijklmnopq	10.40defghijk	40fghi	70.67jkl	71.67fgh	HS	4033.33
M8 NN-1 409	98.67bc	14.20hijklmnop	10.36defghijk	40.33efgh	75.00defghi	73.33fg	HS	3226.67
M8 NN-1 459	91.67mn	13.06rs	11.03bcdef	35.33lm	66.33mn	83.33abcd	HS	2420
P-219 WAXY	94.33ghi	14.20hijklmnop	10.53defghijk	41.33def	74.66efghi	78.33cdef	HS	2420
P-366 WAXY	100.33a	15.33abcde	10.56defghij	40.33efgh	75.00defghi	19opq	MR	3226.67
P-970 WAXY	89.67p	14.50efghijklm	10.13ghijk	38.33jk	70.33jkl	15.33pq	MR	2420

P-989 WAXY	91.67mn	13.46opqrs	9.80jk	38.66ijk	70.33kl	20.67nop	MS	3226.67
P-1108 WAXY	92.67klm	14.96abcdefgghi	10.63cdefghuj	38.66ijk	70.66jkl	88.33ab	HS	3226.67
M8 P-1818	94ghij	15.43abcd	10.60cdefghij	40.66efgh	78.00bcd	68.33gh	HS	1613.33
P-1839	94.67fgh	14.30hijklmnop	10.96bcdefg	39.6ghij	75.00defghi	73.33fg	HS	2420
P-2149	100.67a	15.46abc	10.56defghij	39.33hijk	75.66defgh	88.33ab	HS	2016.67
P-2256	98.67bc	14.56defghijklm	10.67cdefghij	40fghi	73.33fghij	65h	HS	3226.67
P-2513	97.67cd	14.60cdefghijklm	10.53defghijk	43abc	76.00DEFG	87.67ab	HS	1613.33
P-2556	95.67ef	14.73bcdefghijk	11.0bcdefg	40.67efgh	73.00ghijk	85abc	HS	2420
P-2557	93.67hijk	14.90abcdefghij	10.40defghijk	41.66cde	77.00de	90a	HS	1613.33
P-2764	96.67de	15.67a	10.36defghijk	40fghi	76.00defg	90a	HS	1613.33
P-2796	97.67cd	14.83abcdefghij	10.50defghijk	38k	70.00kl	85abc	HS	2420
E-24	94.67fgh	14.90abcdefghij	10.86bcdefg	40.33efgh	78.00bcd	90a	HS	2420
E-32	98.33bc	15.50ab	10.50defghijk	35lm	76.66de	68.33gh	HS	3226.67
M8 NN1-285	84.67s	14.90abcdefghij	10.83bcdefg	40.33efgh	72.66hijk	35jkh	MS	2420
CIMMYT- 129	93.67hijk	15abcdefggh	10.70cdefghi	44a	62.33o	23.33mno	MS	1613.33
CIMMYT 145	97d	14.53efghijklm	10.67cdefghij	41defg	71.00jkl	78.33cdef	HS	1613.33
P-196 WAXY	98.67bc	14.96abcdefgghi	10.46defghijkl	34.33m	75.00defghi	81.67bcde	HS	2016.67
GANDUM 5	92lmn	12.76s	10.73cdefghi	36l	73.33fghij	81.67bcde	HS	1613.49
Maraco	90lmn	13.65opqrs	10.44defghijkl	36l	70kl	90a	HS	16.00

Results and Discussion:

Forty five wheat lines/mutants developed at National Institute for Biotechnology and Genetic Engineering (NIBGE) were subjected to artificial inoculation of multiple races of yellow rust under field conditions to assess their phenotypic response. Four lines (PGMB-27, 2008-1MR, NW 3-11, and CIMMYT-126) displayed highly resistant reaction against yellow/stripe rust disease (table1). Two lines (2008-14 MR and 2011-11 MR) showed resistant response against the disease. Four lines/mutants (NW 275-2, M8 NN1-239, P-366 waxy and P-970 waxy) exhibited moderately resistant reaction against the yellow rust pathogen. Seven lines/mutants (2008-12, 2008-14-1, 2008-2-2, M8NN1-212, P-989 waxy, M8 NN1-285 and CIMMYT 129) showed moderately susceptible reaction while 2 lines (2012-36, and 2012-117) proved susceptible against yellow/stripe rust disease under field condition. Twenty six lines/mutants (NNI-89, E-504, NW-167, 2011-2MR, 2011-3, 2012-113, M8NN1-1251, M8NN1-362, M8NN1-409, M8NN1-459, P-219 WAXY, P-1108 WAXY, M8P-1818, P-1839, P-2149, P-2256, P-2513, P-2556, P-2557, P-2764, P-2796, E-24, E-32, CIMMYT 145, P-196 WAXY and GHANDUD-5) found highly susceptible against yellow/stripe rust disease under field condition. Lowest disease severity *i.e.* 3.33 was observed in wheat line PGMB-27 and rated as highly resistant. Highest severity of disease (90%) was noted in mutated wheat lines of Punjab-11 (P-2557 and P-2764). One line (E-27) was also at par with 90 disease severity. Data related to others parameters like yield, Days to flowering and grain quality parameters were also collected. As for as days to 50% flowering is considered a great variation was observed among different varieties. The mutant

wheat line NN1-285 was depicted as early flowering mutant line with 84.67 days to bloom 50% plants followed by wheat line 2012-113 with 85 days for 50% plants to flower. The lines with late flowering were E-504, P-2149 and P-366 waxy with 101.33, 100.67 and 100.33 days respectively. Wheat lines with excellent disease response as well as with good yield are pre-required for varietal approval. In our study PGMB-27 was depicted excellent both in disease reaction and yield. The highest yield *i.e.*, 5243.33 kg/hectare was found for PGMB-27 and it out-classes all the other lines/mutants. The other wheat lines *i.e.* 2011-3, 2012-36 and NN1 409 were at par with yield potential of 4033.33 kilogram per hectare. These lines/mutants were susceptible to yellow rust disease under field condition but good yield was due to their yield potential. As shown in table-1 that lowest protein contents (12.76) was observed in Ghandum-5 while highest (15.70) was found in wheat line 2008-12. Not a great variation regarding moisture contents was found in resistant as well as susceptible lines. Lowest moisture contents (9.66) were observed in wheat line 2008-12 while highest in PGMB-27 with 11.67%. Gluten percentage is very important for good quality bread, lowest gluten percentage was found in wheat line P-196waxy while highest in wheat line 2012-113 with gluten percentage of 44.33 percent. Zelenyl was observed in the range of 61-82% in all wheat lines/mutants with lowest (61) in PGMB-27 while highest (82) in wheat line N275-2. Over the last couple of years the incident of yellow rust is on the rise in wheat varieties. Many high yielding wheat varieties have lost resistant against yellow rust like Inqalab-91, Sehar 2006 and NN1. Therefore new varieties with good yield is of utmost important to meet the dietary requirements of the of Pakistan. The most efficient and environment friendly approach is the use of resistant variety. In previous years many studies have been conducted to evaluate the wheat varieties/lines against rust diseases especially yellow rust in Pakistan. Unfortunately no attention was paid to screen wheat varieties/lines against yellow rust with high yield and early maturing and with good protein as well as gluten contents. During wheat cropping season 2018-2019, environment remained very conducive for yellow rust attack as high rainfall was observed during the month of January and February providing excellent opportunity for researcher to screen out the genetic stock against the disease. In our study some wheat line/mutants were categorized as susceptible but they gave good yield that indicate their genetic potential. The wheat lines with moderately susceptible to susceptible reaction with better yield could be selected for breeding program to study their genetics behavior. To study the impact of disease on days to flowering a separate research work is needed wherein inoculation of on seedling stage may be adopted. As for as impact of yellow rust on grain quality parameters is concern, protein contents are found in greater amount in susceptible lines that may be the shriveling of grains. These findings are in line with the previous work carried out by Ashenafi and Alemayehu, they found positive correlation with disease severity and grain protein contents. The search work of K. E. Mwando *et al.*, also substantiate our results. Our research work are also tandem with findings of Ayed Sourour *et al.*, they studied Correlation between agronomical and quality traits in durum wheat. Finding of Mobarak *et al.* also support our results. W. H.P. Boshoff *et al.* studies the Fungicide efficacy and the impact of stripe rust on spring and winter wheat in South Africa and came out with results that un- treated plots has high contents of protein in grain as compared to with treated plots. Niels Matzen *et al.* also study the Grain quality in wheat with respect to Impact of disease management and found high protein contents in diseased grain that match our findings. Tegwe *et al.* 2018 studies the yield losses with different level of stem rust and found higher contents of protein in some diseased wheat varieties/lines. Several studies regarding resistant potential of wheat lines/genotypes had been conducted in past to study the response against disease under field

condition. Nadeem Afzal *et al.*, studied the resistant potential of 188 wheat genotypes/lines in 2009 under field condition and found 150 lines/genotypes with acceptable relative resistance index. Waqaz Raza *et al.*, 2018 investigated the resistant status of 149 lines of wheat against yellow rust and found 60 lines/genotypes immune against yellow rust. These results are compliments with our findings as narrow range of resistant genotypes were found in our study too. Saima Arain *et al.*, evaluated eight lines/mutants of wheat against rust under field condition and only two mutants were graded as resistant. Ehsan al-Haq *et al.*, 2003 conducted a research trial and 15 lines found resistant out of 29 lines of wheat. Maqsood Qamar *et al.*, studies the disease response of seven wheat lines against rust and found no lines resistant. S. ALI *et al.*, 2008 evaluated 20 wheat lines/genotypes against yellow rust disease under field condition and found nine wheat lines/genotypes under the category of resistant.

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Integration of Ukrainian Refugee Athletes into the Olympic Channel of Their Neighboring Countries

Gheorghe Braniste

Abstract— It is a matter of common knowledge the fact that the International Olympic Movement is characterized by dynamism and adaptability to the challenges of modern society. A significant proof of this is the establishment of the IOC Refugee Olympic Team, since 2016, at the Olympic Games in Rio de Janeiro, a practice continued in Tokyo in 2020 and with great chances to be successfully repeated in subsequent editions: Paris 2024 and Dakar 2026. This phenomenon is all the more welcome as, after the global refugee crisis of 2015, when the whole world has seen millions of people in the world displaced, we are now experiencing the negative effects of the war in started in February 2022 in Ukraine; which caused the exodus of the population to neighboring countries. Therefore, the international Olympic community must decide how to integrate Ukrainian athletes with refugee status into the Olympic system. Until the establishment of an internationally agreed policy, Romania and the Republic of Moldova, as countries directly involved in this process, must find urgent solutions to allow athletes to continue their Olympic career. This article proposes a description of the strategies adopted both at the national level and at the level of sports clubs and the analysis of their impact on the performance of athletes.

Keywords— Olympic Movement, Olympic Games, Refugees, performance, integration.

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The Effect of Vitamin D Supplements and Aerobic Exercise on Hunger and Serum Insulin Levels in Adolescents with Metabolic Syndrome

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Abstract—

Metabolic syndrome is defined as having at least three of the five metabolic risk factors, including abdominal obesity, high blood pressure, high triglycerides, low HDL, and insulin resistance. Lifestyle changes towards reducing physical activity, unhealthy eating habits Especially the high-fat and high-carbohydrate diet is directly related to metabolic syndrome, and due to the epidemic of overweight and sedentary life, metabolic syndrome is a serious problem worldwide. On the other hand, vitamin D deficiency is considered as one of the most common problems in the world, which is related to the dysfunction of beta cells and insulin resistance, and therefore, vitamin D deficiency is considered as a factor in the occurrence of metabolic syndrome.

40 subjects (age: 16.12 ± 4.4 years and body mass index 25.61 ± 4.4 kg/m²) were randomly assigned to groups of aerobic exercise and placebo, aerobic exercise and vitamin D and placebo (no exercise) were divided. Vitamin D was taken at a dose of 50,000 units per week in a double-blind format for eight weeks, and the daily aerobic exercise program was performed for 50 to 60 minutes, three doses per week, with an intensity of 50-60% of the maximum heart rate. From one-way analysis of variance, Factorial variance analysis (2x2) repeated measurement and correlated t-test were used for data analysis. Aerobic exercise and vitamin D intake reduced all metabolic risk indicators and blood insulin ($P < 0.05$).

However, the subjective feeling of hunger did not change significantly ($P < 0.05$). Regarding waist circumference and blood glucose, the effect of exercise combined with vitamin D consumption was greater than the corresponding effect in the vitamin D group ($P < 0.05$). Aerobic exercises and vitamin D intake are safe and effective for improving cardiometabolic health, Imam adds vitamin D to the exercise program has more benefits for weight and blood sugar control, which suggests prescribing it for patients with metabolic syndrome.

Keywords: vitamin D, aerobic exercise, metabolic control, adolescents.

An Evidence-based Lifestyle Approach to Cancer

Bruce W. Mylrea

Abstract— Bruce Mylrea, best-selling author of "A Plant-powered Approach To Prostate Cancer" shares the major lifestyle changes he implemented after being diagnosed with advanced prostate cancer 11 years ago. This presentation cites empirical research about diet, fitness and life-style as they relate to cancer development and post-diagnosis outcomes.

Keywords— cancer, nutrition, mentalhealth, physical fitness.