



# 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research

11<sup>th</sup> & 12<sup>th</sup> April 2023 | Bangkok, Thailand

Organized By

Institute For Engineering Research and Publication (IFERP) Thailand Society

In Association with

Rajabhat Maha Sarakham University, Thailand

Iloilo State University of Fisheries Science and Technology, Philippines

Wainganga College of Engineering & Management, Nagpur, India

Cebu Technological University, Philippines





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IFERP – Explore



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# WELCOME TO 4TH ICMCER

2023

Bangkok, Thailand

## PREFACE

The 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023) is being organized by Institute For Engineering Research and Publication (IFERP)-Thailand Society in Association with Rajabhat Maha Sarakham University-Thailand, Iloilo State University of Fisheries Science and Technology-Philippines, Wainganga College of Engineering & Management-Nagpur, India and Cebu Technological University-Philippines in Grand Mercure Bangkok Atrium, Bangkok, Thailand on the 11<sup>th</sup> & 12<sup>th</sup> April, 2023.

The ICMCER-2023 was a notable event which brings Academicians, Researchers, Engineers, Industry Experts and Students together. The purpose of this conference is to discuss applications and development in area of "Engineering, Technology, Management and Current Educational Research" which were given international values by Institute For Engineering Research and Publication (IFERP).

The International Conference attracted over 200+ submissions. Through rigorous peer reviews 80+ high quality papers were recommended by the Committee. The Conference aptly focuses on the tools and techniques for the developments on Multidisciplinary and Current Educational Research.

We are indebted to the efforts of all the reviewers who undoubtedly have raised the quality of the proceedings. We are earnestly thankful to all the authors who have contributed their research works to the conference. We thank our Management for their wholehearted support and encouragement. We thank our principal for his continuous guidance. We are also thankful for the cooperative advice from our advisory Chairs and Co-Chairs. We thank all the members of our local Organizing Committee, National and International Advisory Committees.



## ABOUT ICMCER-2023

The primary goal of the 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023), is to shed light on the hurdles linked to the practical administration of all the most modern information being produced in educational research, from a multidisciplinary perspective. Today, more than ever, budding academics, scholars, and researchers in the initial degrees of their careers are discovering it to be increasingly difficult to keep up-to-date with advancements that are taking place. This convention strives to assist them in keeping up with all these developments.

The intention of the 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023), is for authorities, academics, professionals, and students involved in educational research from a multidisciplinary perspective, from all over the globe, to gather collectively and bestow contemporaneous research findings that familiarize and enlighten participants concerning the advancements that have been taking place

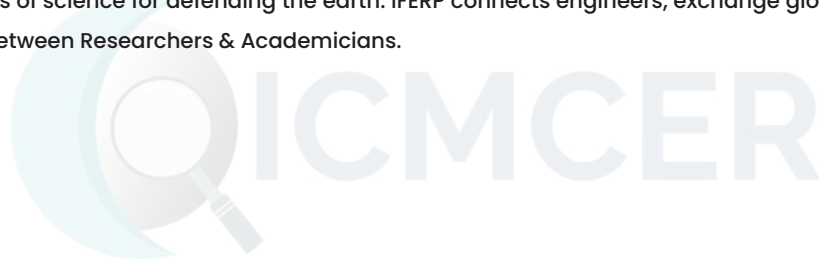
The 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023), supports all researchers (budding and veteran) to present their investigative research outcomes by exhibiting appropriate study articles/presentations/papers at the event, no matter what particular discipline of educational research, they practice in. Those responsible for the most excellent research articles will be rewarded well. They will obtain an unbelievable chance to have their research conclusions and outcomes distributed in prime publications and magazines known and recognized throughout the world. This will not only assist them in obtaining the required exposure that they require to spread the word about their investigative work amongst international research societies but additionally pave the way to a host of unbelievable possibilities for funding and carrying out advanced research projects.

## ABOUT IFERP

Institute For Engineering Research and Publication (IFERP) is a non-profitable professional association meant for research and development in the field of Engineering, Science & Technology. IFERP is on its way to digitize innovation processes through our professional networking services and thus Providing an Integrated Virtual Scientific Community, mutual engagement, exploring Potential of researchers, creating a cooperative and collaborative academic environment.

IFERP is a paramount body which has brought technical revolution and sustainable development in the field of Engineering, science and technology. IFERP fulfills the need of professionals even for their end to end research & development. IFERP supports the professional growth of its members by providing opportunities for professional networking, life-long learning and career development. Our members, associates, students & staff together made a few milestones achieved through our R&D activities in nook & corners of the world.

IFERP is a forum where innovations & research interest could be supported and developed prioritizing our mutual interest. Our forums & Associates consist of Professional leaders, Engineers, Academicians, Delegates, Scientists, students, Universities, Institutions, Industries, Organizations & Associations connecting each other with a mission to work as wizards of science for defending the earth. IFERP connects engineers, exchange global innovation and act as a bridge between Researchers & Academicians.





## MANAGING DIRECTOR'S WORD, IFERP



**Mr. A. Siddh Kumar Chhajjer**

Managing Director & Founder,  
Institute For Engineering Research and Publication (IFERP)

On behalf of IFERP & the organizing Committee, I express my hearty gratitude to the participants, keynote speakers, delegates, reviewers and researchers.

The goal of the ICMCER 2023 is to provide knowledge enrichment and innovative technical exchange between international researchers or scholars and practitioners from academia and industries in the field of Multidisciplinary and Current Educational Research. This conference creates solutions in different ways and to share innovative ideas in the field of Multidisciplinary and Current Educational Research. ICMCER provides a world class stage to the Researchers, Professionals, Scientists, Academicians, and students to engage in very challenging conversations, assess the current body of research and determine knowledge and capability gaps.

ICMCER 2023 will explore the new horizons of innovations from distinguished researchers, scientists and eminent authors in academia and industry working for the advancements in Multidisciplinary and Current Educational Research from all over the world. ICMCER hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in Multidisciplinary and Current Educational Research.

## CHIEF EXECUTIVE'S WORD, IFERP



**Mr. Rudra Bhanu Satpathy**

CEO & Founder,  
Institute For Engineering Research and Publication (IFERP)

IFERP is hosting the 4th International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023) this year in the month of April. The main objective of ICMCER 2023 is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points, and experience enormous growth and development as a professional. There will be no shortage of continuous networking opportunities and informational sessions. The sessions serve as an excellent opportunity to soak up information from widely respected experts. Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader.

I express my hearty gratitude to all my Colleagues, staff, Professors, reviewers and members of the organizing committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their painstaking effort to make this conference successful.

## KEYNOTE SPEAKER

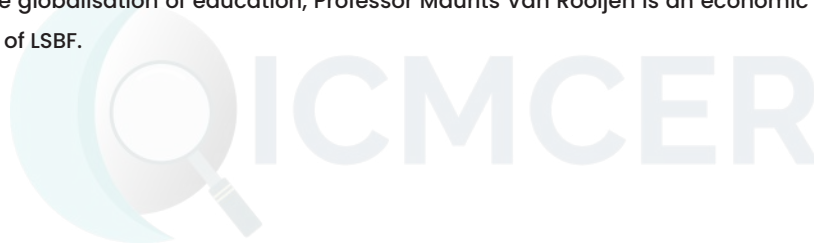


**Dr. Maurits Van Rooijen**

Rector, University of Europe for Applied Sciences,  
Germany.

### Biography

Professor Maurits Van Rooijen is the Chairman of GISMA's Board of Governors, Chief Academic Officer (CAO) of Global University Systems, and Rector of the University of Europe for Applied Sciences, Germany. In addition to these roles, he is the Board Chair for IBAT College Dublin, Ireland. He was awarded the Constance Meldrum prize for Vision and Leadership from the European Association for International Education (EAIE) and the Insignia d'Ouro of the Universidad Santiago de Compostela. With a career spanning 25 years as an international educator and pioneer in the globalisation of education, Professor Maurits Van Rooijen is an economic historian and Chief Academic Officer of LSBF.



## KEYNOTE SPEAKER



**Dr. Lampong Klomkul**

Acting Director, Research, Information and Academic Services Division,  
ASEAN Studies Centre, Mahachulalongkornrajavidyalaya University, Thailand.

### Biography

Dr. Lampong Klomkul is an Acting Director for Research, Information and Academic Services Division, ASEAN Studies Centre, and a lecturer from Faculty of Education, Mahachulalongkornrajavidyalaya University. She Graduated in Doctor of Philosophy (Ph.D.) in Educational Research Methodology, Faculty of Education, Chulalongkorn University, Thailand. She received award from National Research Council of Thailand: The best dissertation of year 2013 at Good Level (Education Field), received Graduate Scholar Award from The Nineteenth International Conference on Learning, The Institute of Education University of London, London, UK, August 14-16, 2012. She also received Golden Jubilee Scholarship to study in Canada for two years in Bachelor degree from 1997-1999. She also received best researcher in the year 2020 at excellent level from Buddhist Research Institute, Mahachulalongkornrajavidyalaya University. She is interested in conducting research in Education and ASEAN Studies. She is the author, co-author or editor of more than 40 articles and books. She has an experience of being a guest speaker and organizing international conferences. She has also completed research project in various research designs such as Structural Equation Model (SEM), Ethnographic Delphi Future Research (EDFR), and Mixed Methods Research (MMR).



## KEYNOTE SPEAKER



**Dr. Pornchai Jedaman**

Associate Professor, Rajabhat Mahasarakham University,  
Maha Sarakham, Thailand.

### Biography

Assoc. Prof. Dr. Pornchai Jedaman. Ph.D. in Human Resource Development. From Research and Development Institution at Rajabhat Mahasarakham University. Thailand. Research and academic experience of human resource development (HRD), human resource management (HRM), integration management, leadership and teacher professional development, organizational management and development, educational management.



## SESSION SPEAKER



**Dr. Christopher Garnier**

Executive Director, Asian Institute of Technology,  
Bangkok City, Thailand

### Biography

Dr. Garnier earned his Ed.D. in Global Education and M.A. in Teaching from the University of Southern California. He also received a M.S. Equivalency in Aeronautical Engineering from the United States Navy, Pensacola, Florida. He has a B.A. from the University of Hawaii.

Dr. Garnier was most recently the Dean of Ace International Business School in Kathmandu, Nepal. He is currently serving as an Independent Education Advocate and Consultant in the United States as well as an Ambassador of HundrED based in Helsinki, Finland. Dr. Garnier is also an Adjunct Faculty of the AIT School of Management.

Prior to that, Dr. Garnier was a CEO for a leadership training company for young men and women in San Diego, CA. Earlier in his career, he was a helicopter pilot/trainer/operations officer for the United States Marine Corps, serving in several countries in Asia and rising to the rank of Captain.

He has a track record of delivering innovative, transformative and results-focused initiatives to multiple educational entities, a student rights advocate and international lecturer with extensive and unparalleled leadership experience covering the United States, Middle East, Asia-Pacific and Europe.

## SESSION SPEAKER



**Dr. Manzoor Malik**

Program Director (Philosophy and Religion), Assumption University,  
Bangkok City, Thailand.

### Welcome Message

I welcome you to the 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023). The conference themes are Education, Business, Science, Humanities and social sciences. That makes the platform comprehensive in addressing the contemporary developments in the areas of knowledge and makes the nature of the conference interdisciplinary by which scholars can benefit from each other and exchange views on their interests. Therefore, I encourage scholars to participate in the conference and value this opportunity for scholarly exchange and academic networking.



## SESSION SPEAKER



**Mr. Deepak Paramanand**

Director of Artificial Intelligence, JP Morgan Chase & Co.,  
London, England, United Kingdom.

### Biography

Deepak Paramanand has worked across three continents, six companies and five domains from Business Intelligence (BI) to Artificial Intelligence (AI) and everything in between.

Paramanand is currently working as Executive Director of AI Research and Product Management at JP Morgan where he is building products based on cutting-edge research spanning Unsupervised Learning, Reinforcement Learning and Blockchain.

Previously, as Senior Product Manager with the Microsoft SwiftKey team, Paramanand launched an AI-First product called puppets, Microsoft's answer to Apple's Animoji on Android.

Puppets was based on computer vision CNNs built to perform on Android devices.

He has also worked as Product Manager for the Secure Mobility Platform, Synchronoss's offering in the Enterprise Mobility Management area.

Before transitioning to a Product Manager, Paramanand was a BI Architect in a wide variety of business applications. The executive has worked in relational database design using Oracle, SQL Server.

Paramanand himself says he has always been interested in designing stable, cost-effective and scalable BI solutions.



## SESSION SPEAKER



**Mr. CH Siddharth Nanda**

Deputy Director, Amity Institute of Travel and Tourism, Amity University Kolkata,  
Newtown, Kolkata, West Bengal, India.

### Welcome Message

I am enormously delighted to participate in the 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023), 11th - 12th, April 2023 | Bangkok, Thailand; Organized by Institute for Engineering Research and Publication (IFERP) - Thailand Society; In association with Rajabhat Maha Sarakham University, Thailand.

Multidisciplinary research in education involves the integration of knowledge and perspectives from different fields of study to address complex issues in education. This approach recognizes that education is a system that involves multiple factors, including social, cultural, psychological, and economic factors. By combining insights from different disciplines, researchers can develop a more comprehensive understanding of the challenges facing education and identify more effective strategies for addressing these challenges.

My heartfelt gratitude goes to the organizers for their tireless efforts in making this scientific event memorable, stimulating, and successful. My gratitude also extends to all of the participants. I wish you the best of luck.

## SESSION SPEAKER



**Dr. Shanthi Mahesh**

Professor, Atria Institute of Technology,  
Bengaluru, Karnataka, India.

### Welcome Message

I am extremely delighted to participate in the 4<sup>th</sup> International Conference on Multidisciplinary and Current Educational Research (ICMCER-2023) on 11<sup>th</sup>-12<sup>th</sup>, April 2023 in Bangkok, Thailand. Organized by Institute For Engineering Research and Publication (IFERP) - Thailand Society and In association with Rajabhat Maha Sarakham University-Thailand, Iloilo State University of Fisheries Science and Technology-Philippines, Wainganga College of Engineering & Management-Nagpur, India and Cebu Technological University-Philippines.

I anticipate this conference will provide researchers and scholars with in-depth insight into Multidisciplinary and current educational research. I wholeheartedly wish to all participants to move forward to conduct further advanced research in multidisciplinary technologies.

My special thanks to the organizers for their great efforts in making this scientific event remarkable and successful. My whole hearted thanks also go to all the participants. Wishing you all the best.

## SESSION SPEAKER



**Dr. Snehal Abhyankar**

Head of the Department, Department of Civil Engineering, Wainganga College of Engineering & Management, Nagpur, Maharashtra, India.

### Biography

Dr. Snehal Abhyankar is NBA CO-ordinator , HoD Civil Engineering & Associate Professor of Wainganga College of Engineering & Management, Nagpur. She graduated in Civil Engineering. She completed Master of Technology in Structural Engineering. She completed her PhD in Fibre Reinforced Cement Concrete mixes. She has been associated in teaching profession from last fifteen years. She is life member of IEI(I), IWWA, ASCE. She received "Academic Excellence award" from Indian Water Works association in 2021. She is member of International Scientific Committee of Civil & Environmental Engineering of World Academy of Science, Engineering & Technology (WASET).

She is on Editorial Board of Journal of Civil, Construction and Environmental Engineering. She has published 6 book chapters in Springer, one copyright, 35 technical papers in International, National Conferences and Journals. She organised International Conferences, conducted several workshops & guest lectures for students and faculties. Her research interests include Fibre reinforced Concrete, composites, sustainable concrete, use of agricultural waste . She has guided several undergraduate and post graduate students.

## SESSION CHAIRS



**Dr. Mallika Subongkod**

Lecturer of Business Administration, King Mongkut's Institute of Technology Ladkrabang,  
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Lecturer, Business Administration,  
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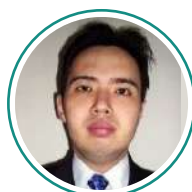
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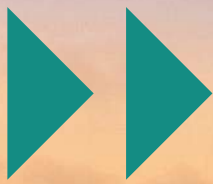


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# 4<sup>TH</sup> ICMCER ABSTRACTS



Bangkok, Thailand

# Clinical Significance in Psychological and Educational Research: Does it matter?

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## Abstract

The main aim of this study was to confirm the importance of the concept of clinical significance. Also, this study aimed at discriminating among the concepts statistical, practical and clinical significance. In addition, this study attempted to present the most known methods to estimate the clinical significance of psychological and educational studies. These methods were Jacobson-Truax method (JT), GulliksenLord - Novick method (GLN), Edwards-Nunnally method (EN), Hageman-Arrindell method (HA), and Hierarchical Linear Method (HLM). The current study constraints on the Jacobson-Truax method (JT) and via using hypothetical data, psychological and educational examples were presented to explain how to implement JT method. Moreover, via applying JT method this study attempted to introduce a suggested model to investigate the clinical significance of the treatment on the differences among the groups of the experimental designs. Finally, the results of this study confirmed the value of investigating the clinical significance of the psychological and educational studies because the results could be statistically and practically significant although could not indicate to clinical significance either on the individual or groups level.

## Keywords

Clinical Significance, Statistical Significance, Practical Significance, Jacobson-Truax Method

# Bibliometric Review: Creative Thinking Ability Research in Junior High School (1973–2023)

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## Abstract

Creative thinking is important in increasing the formation and discovery of learning ideas in junior high school students in the 21st century. This study uses bibliometric analysis to capture the relevant previous research landscape related to creative thinking in junior high schools from 1973 to 2023. from the Scopus database, it was refined to become 151 publications. 2022 has published the most articles compared to other years, namely 42 publications. The trend of citations related to creative thinking in junior high schools occurred in 2017, with 286 citations. Indonesia is the most influential country in this field, with 89 publications and 21 links to cooperation with other countries. Of the 151 published journals, 49 of them have been published in the Q1 journal. The focus of research on creative thinking in junior high schools is 1) technology, gender, and environment; 2) outcome, discovery, and the 21st century; 3) achievement and motivation. The limitations of this research are the data analyzed come from the Scopus database, so there are many other databases that can be used, such as Wos and others, and this research only discusses creative thinking in junior high schools in general, so there are many other fields of education that can be further investigated. We recommend that future researchers expand the data search database and the range of educational levels.

## Keywords

Creative Thinking, Junior High School, Bibliometric Review

# Geogebra Research Focus in Learning Mathematics from 2007 to 2022: A Bibliometric Review

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## Abstract

Geogebra is software designed for teaching and learning, whose main goal is to make math concepts clearer and easier to understand for students. This study aims to capture the landscape of previous research that is relevant to Geogebra in mathematics learning from 2007 to 2022 using bibliometric analysis. The data taken from the Scopus database was refined so that it became 91 publications. The United States, South Africa and Turkey are the most influential countries and have high cooperation with other countries in this field. The focus of this research are: 1) development of Geogebra learning media especially for junior high schools and senior high schools; 2) conceptual understanding, motivation and student learning outcomes at the university level; 3) training for teachers in conducting learning using Geogebra; 4) materials in learning mathematics such as geometry, calculus, and algebra to attract students' interest. The results of this study can be used as a reference for future researchers who wish to examine this theme in order to understand the research focus and set a path for further research.

## Keywords

Geogebra, Mathematics Learning, Bibliometrics, Vosviewer



# Competence: Does the Presence of Consultants from Services other than Big-4 Improve or Compromise the Assurance of Quality Sustainability Reporting?

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## Abstract

In the business field, consulting firms in the environmental sustainability service are currently executed by audit firms called the Big Four. Established internationally with membership on each of the continents. which carry out the consultancy of the companies listed on the stock exchange, the work of the orders includes elements of the sustainability indicators, as well as the delivery of the report with the respective opinion, therefore, the objective of the work is to determine the situation current sustainability consulting market and its relationship with sustainability reports based on quality, the applied methodology consisted of collecting data from companies and consulting firms, consistent with the descriptive analytical method.

## Keywords

Audit, Audit Firms, Business market, Sustainability



# Development of Mass Media Communication: A way of Changing New World

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## Abstract

Mass media is a small word but its scope has broad justification. It is called the information repository and it is having a great impact on our daily life. Communication is used for passing information from one person to another. Communication development has various roles, one of these is transformational role which towards the hygiene taste of today's generation and social change to maintain some established values of the society. Media plays an important role in the development of communication through knowledge transfer. It provides forum for discussion of issues, teaches ideas, builds consensus for better life skills and stability.

New technologies and developments are being used to communicate the interactive nature of media like mobiles, websites and the internet, which are used for interactivity, instant feedback and persuasiveness to rope common people into the development process. Since the beginning of development, development communication has been pursued by both traditional and new forms of media. The aim of this research paper is to study how the influence of mass media will contribute to the development of the world by focusing on the opinions of people of different age groups.

Strengths and weaknesses of media and people's message and access to these media should be considered to achieve success that will not be confined to paper only. In this paper, we conducted a survey among people of different age groups and determined the influence and opinion of mass media on them. Finally suggested a solution to this issue.

## Keywords

Development, Communication, Mass Media, Changing, New World

# Teacher Support and Academic Resilience in Vietnam – An Analysis of Low SES Students in PISA 2018

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## Abstract

This study aimed at investigating the association between teacher support and academic resilience in a developing country. Using the data from PISA 2018 Student Questionnaire and Cognitive Tests, the study provided evidence of significant impact teacher support had on reading literacy among 15 year-old students from low socio-economic status (SES) homes in Vietnam. From a total of 5773 participants from all backgrounds, a sample of 1765 disadvantaged students was drawn for analysis. As a result, 32 percent of the low SES sample was identified as resilient. Through their response to the PISA items regarding the frequency of support they received from teachers, Latent Class Analysis (LCA) divided children into three subgroups: High Support (74.6%), Fair Support (21.6%) and Low Support (3.8%). The high support group achieved the best mean score in reading, and reported the highest proportion of resilient students. Meanwhile, low support group scored the lowest mean and had the lowest rate of resilience. Also, as level of support increases, reading achievement became less dependent on socio-economic status, reflected by the decrease in both the slope and magnitude of their correlation. The study emphasizes the role of supportive teachers in promoting resilience, and lowering educational inequity in general.

## Keywords

Teacher Support, Academic Resilience, Vietnam, PISA

# A Design for Developing an Interactive Academic Student Advising System using Smart Personal Assistant Platform

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## Abstract

In recent years, there has been a significant surge of interest among researchers and software developers in incorporating Smart Personal Assistant (SPA) technology into higher education institutions as a means of enhancing communication between faculty and students. SPA applications have been recognized as effective tools in facilitating self-directed learning among students. However, previous studies have highlighted students' dissatisfaction with the current advising process due to high student-to-advisor ratios, limited interaction opportunities, and slow response times from advisors. In light of these challenges, the primary aim of this study is to design an interactive academic student advising system using Alexa, guided by the ICAP framework. The ICAP framework serves as a blueprint for constructing a system with interactive functionalities that cater to the needs of students and faculty. Finally, this paper concludes by addressing the potential challenges that may arise during the development phase and highlighting future research directions of this research.

## Keywords

ICAP framework, Alexa, Student advising, Interactive

# IP Cameras Beyond Security: A Systematic Literature Review Examining their Adoption and Potential in the Healthcare Industry

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## Abstract

There is a growing interest of IP Camera usage in the healthcare industries. IP Cameras are now being used in healthcare including patient monitoring, healthcare, telemedicine, etc. This paper aims to determine the applications of the IP Camera in the healthcare industry including how it is used in these applications to serve as a tool for future researchers to understand how they can use IP cameras in their future endeavors. A total of 31 related literatures and studies published from 2019 to 2022 were gathered, all of which used IP cameras in their specific studies. A code for each study was created according to their specific application and use. Results show that IP cameras were mainly used in 12 applications, mostly for Deep Learning, Robotics, and COVID-19 Application. These cameras were also used in 7 roles, mainly remote monitoring, telemedicine, telerehabilitation, and capturing data for model training, testing, and use. Overall, this study showed that IP cameras play a crucial role in the healthcare industry and have the potential to improve and revolutionize the way healthcare services are delivered such as improving telemedicine and promoting the use of telerehabilitation. Future research includes examining the use of IP cameras in other industries, especially in smart home environments, how IP cameras are used in different deep learning algorithms, and analyzing the benefits and challenges of IP cameras in different applications.

**CCS CONCEPTS:** General and reference ~ Document types ~ General literature

## Keywords

IP Camera, Applications, Healthcare, Monitoring, Systematic Literature Review

# Speaking Self-Efficacy of Senior High School Students in Oral Communication in Context

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## Abstract

Numerous studies discovered that high levels of self-efficacy are related with good performance in various language learning activities. In the Philippines, most of the studies conducted on self-efficacy focused more on other macro-skills such as reading and writing whereas there were only limited studies which focused on speaking. Hence, this study aims to identify the level of speaking self-efficacy of senior high school students, specifically Grade 11 Humanities and Social Sciences (HUMSS) students, in Oral Communication in Context. Quantitative descriptive research design is used to collect descriptive information regarding the main variable which is speaking self-efficacy. A 28-item questionnaire is used to collect the main data and a focused group discussion is conducted to further analyze and verify the results of the study. The result of the study shows that the senior high school students have high levels of speaking self-efficacy. Notably, the majority of the highest indicators regarding speaking self-efficacy beliefs are attributed to one of the sources of self-efficacy which is mastery experience. It is recommended that teachers may further improve the speaking self-efficacy of senior high school students by providing social persuasion in the form of realistic verbal messages about their oral communication performance.

## Keywords

Speaking Self-Efficacy, Oral Communication, Second Language

# Teaching Folk Dances: The Challenges Faced by Elementary Teachers of District Four of the City Schools Division of Las Pinas

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## Abstract

The educational foundation of teachers has an impact on the way they teach and the depth of their teaching. Several factors can attribute to the challenges that teachers were facing in teaching folk dances to children. One, children were no longer exposed to folk dances at home, school, and in the community. Also, the teacher's readiness to teach create meaningful learning for the pupils.

The purpose of this study was to investigate the contributing factors experienced by public elementary teachers in District 4 of the City Schools Division of Las Pinas" in teaching folkdances to pupils.

This study analyzed the teachers' responses and found out that teachers were not confident to teach folk dance due to the following factors: there was no proper training on how to teach folk dance; elementary MAPEH teachers were generalists; insufficient knowledge of folk dance terminologies and identifying folk dances; inadequate skills in performing folk dance steps and interpreting folk dance literature when teaching the dance.

## Keywords

Educational Foundation, Teacher, MAPEH, Skills, Learning



# Internet Dependence and Fact Checking among Senior High School Learners in Davao City

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## Abstract

The study aimed to determine the significant relationship between the internet dependence and fact checking among senior high school learners in Davao city. The study used quantitative research design utilizing descriptive-correlational method. Random sampling technique was employed to identify the 250 senior high school learners in three public secondary institutions in Davao City – one school per district. They served as the respondents of the study. To guarantee ethical standards in data gathering, informed consent was accomplished. Data gathering was done online using Google form. In analyzing the data, mean, Pearson Product Moment Correlation of Coefficient and Regression Analysis were used. The researcher found out that there is a significant relationship between the internet dependence and fact checking among senior high school learners in Davao city. Further, the results showed that both levels of internet dependence and fact checking among senior high school learners were high. Finally, in relation to the analysis, it was revealed that the indicators of internet dependence with regard to perception of internet dependence and impact of internet dependence significantly influence the fact checking of senior high school learners. Furthermore, the Department of Education may include further information about fact-checking to be embedded in the curriculum and make it one of the competencies that student must have. Moreover, the school heads may formulate policies and guidelines for the implementation of fact checking skills among learners in the curriculum standards to ensure efficient implementation.

## Keywords

Internet Dependence, Fact Checking, Fake News, Senior High School Learners, Lateral Reading, Fake News Vulnerability

# Level Up or Respawn: Reviewing Literatures of Game-based Learning

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## Abstract

Gaming shows the potential to provide the necessary solutions to traditional education mediums' gaps. This potential gave birth to the concept of gamified education or game-based learning. Combining gaming elements with educational content. This paper seeks to investigate the current state of gamified education. Past literatures have provided basis that gamified education has promoted motivational and academic growth most commonly among collegiate level and in science classes. Future research can investigate on specific game-based learning platforms such as VR, AR, Mobile, Computer games. Simulation games and its applications in education and industry training is also an interesting topic.

**CCS CONCEPTS:** Applied computing~ Education~ Interactive learning environments

## Keywords

Game-based learning, Educational Games, Academic Performance, Gamified Learning, Literature Review

# The Challenges of Pre-Service Teachers in the New Normal Set up of Field Study Amidst COVID-19 Pandemic

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### **Abstract**

The pandemic had a huge impact on many things and situations, particularly the new normal. The researchers decided that field study of pre-service teachers is one of them because no one has ever taken the course under the new COVID-19 setup. The researchers aim to inform their readers about how the COVID-19 pandemic challenge will affect every pre-service teacher in the new set-up of education through online learning. Purposive homogenous sampling was used to choose 12 students from Rizal Technological University-Boni and Pasig Campuses. Researchers chose typical students, non-workers, and university scholars as participants. Age, gender, and geography vary among participants. Researchers used interviews and supported by an interview script to gather replies. Pandemic-related preparations have been taken. Thematic analysis is used to understand pre-service teachers' challenges in the new field study setup. Pre-service teachers face challenges in this setting, according to the research most are struggling because of the rapid move from traditional classes to the new typical format, causing unpreparedness and lack of expertise when they face more complex situations. In addition, slow internet and a lack of resources make it difficult to attend classes and meet prerequisites. Some have many restrictions, especially on classroom monitoring because of the pandemic. The findings imply that the study's premise is significant and relevant in today's environment, especially for individuals pursuing an education degree and becoming pre-service teachers. Pre-service teachers face new obstacles in the new normal.

### **Keywords**

Pre-Service Teachers, New Normal Set Up, Field Study, COVID-19 Pandemic

# The Impact of Online Learning on Students and Teachers: A Systematic Literature Review Investigating the Effects during the COVID-19 Pandemic

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## Abstract

In the year 2020, the COVID-19 pandemic put the world at a standstill. The pandemic has dramatically impacted the lifestyle of many people in the world as it restricts traveling and physical contact to avoid spreading the infection of the disease. It has severely changed how education works due to shifting to online learning. This paper aims to conduct an intensive analysis of the current studies conducted in the years 2020-2022 regarding the impact of online learning on students and teachers during the COVID-19 pandemic. This paper will determine the factors that affect students' using online learning. Additionally, the effects on teachers and professors will also be included in this study. The aim of this paper is to provide a complete understanding of the effects of online learning on students and teachers during the pandemic and to provide information for educational institutions. The study found that different factors impact students and teachers in online learning, with some similarities. The sudden shift to online learning had a significant effect on students. According to the gathered literature, students' most common difficulties are technological and psychological issues, such as unstable internet connections, lack of socialization and interaction among other students, and isolation. For teachers, problems with internet connections and a lack of training in using technology for online learning also significantly impacted the delivery of lectures. Both students and teachers generally prefer traditional, face-to-face classes.

**CCS CONCEPTS:** CCS CONCEPTS → E-learning ~ Distance Education ~ Student Satisfaction

## Keywords

Online learning, difficulties of online learning, education institutions, COVID-19, Systematic Literature Review

# Applying Lean Strategy by Establishing Logistics Service Providers to Material Supply and Product Delivery in A Fabric Supply Chain

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## Abstract

This paper is to present the application of lean by establishing logistics service providers, and then consider its impact on the material supply and the product delivery in term of time and costs. Besides, the case study of a fabric manufacturer in Thailand is employed to illustrate the possible effect of lean by using logistics service providers to the material supply and the product delivery, and its expected outcome in terms of transport costs and time, is presented. Moreover, the multiple approaching methods coupled with the advanced statistical method (Cluster Analysis) are manipulated as the analytic tools. The findings have revealed the leanness techniques in the practical term including the location cluster and the transport route design coupled with purchasing the one way transport service, and lean by establishing logistics service providers subsequently takes place instead of the former logistics sections of fabric firm. Following this, transport costs and time have been significantly reduced, and customers' satisfaction has been extensively increased. Exceptionally, application of lean by establishing logistics service providers improves performance in time, cost and satisfaction.

## Keywords

Lean Strategy, Logistics And Supply Chain, Logistics Services Provider, Material Supply, Product Delivery

# A Study of the Social and Emotional Skills for Private Secondary Schools Students in Bangkok Based on the Conception of Social and Emotional Skills

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## Abstract

This descriptive research was to study the level of social and emotional skills of private secondary school students in Bangkok based on the conception of social and emotional skills. The informants were 410 high school students from 82 private secondary schools in Bangkok. The tool used in this research was a questionnaire on the levels of social and emotional skills of private high school students in Bangkok. Statistics used for data analysis consisted of frequency, percentage, mean, and standard deviation. The findings revealed that the overall level of social and emotional skills of private high school students in Bangkok was very good. Of the social and emotional skills, the rankings were as follows: 1) responsible decision-making, 2) relationship building, 3) self-awareness, 4) social awareness, and 5) self-management. The findings reflected that private secondary school students in Bangkok the highest ranking in responsible decision-making skills.

## Keywords

Social and Emotional Skills, Private Secondary Schools, High School Student



# Experimental and Didactical Strategy for Improving Understanding of the Fundamental Concepts in Quantum Physics

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## Abstract

Quantum physics is an essential theory serving to explore nature at its smallest scales. Interaction between elemental particles in matter is leading toward new potential alternatives for producing decarbonized clean energies. Despite its importance, students find difficulties understanding quantum mechanics due to a wrong categorization of the fundamental concepts. Studying quantum physics needs a new flexible ontology in which the quantum entity can have particle or wave properties depending on the context. For putting concepts into the correct conceptual categorization, a workshop in quantum devices was developed. With the aim of strengthening interinstitutional exchange, workshop was realized with a population conformed by environmental engineering students of the Corporación Universitaria Uniagraria. Meeting took place in the Institución Universitaria Politécnico Grancolombiano facilities. Laser, LED (Light Emitting Diode), and photocell were the devices used for introducing the most fundamental concepts of quantum physics. The theoretical component of the workshop was divided into two main elements, the first, radiation-matter interaction, and the second, electrical transport mechanisms in materials. Pedagogical instruments employed were diagnostic proof, evaluative proof, and satisfaction inquiry. Despite the success achieved in the general realization of the workshop, students suggested some aspects for considering in future versions.

## Keywords

Quantum Physics, LED, Environment

# The Gains and Losses of Producers and Consumers in the Implementation of Rice Tariffication Law: An Integrated Impact Analysis

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## Abstract

This study aims to investigate the effects on consumer and producers in the advent of the implementation of the law. This study had used the triangulation type of mixed method research design. The quantitative research design was used to analyze the secondary data and survey result with the aid of descriptive and inferential statistics. Meanwhile, the qualitative research design was used to validate the existing statistical results generated from secondary data survey results by conducting in-depth interviews and focus group discussions. This study had evaluated the impact of RTL in macro and micro level both in household and producer sector. The Top-Down Microsimulation had used to assess the impact of the RTL on consumer level in terms of consumption expenditures and poverty and distribution of income. The result of the study revealed that the rice prices for consumers does not automatically lower down with the imposition of Rice Tarrification Law. Moreover, the household is anticipated to experience a conservative decrease in the cost of consumption of rice by 0.45% or a household savings amounting to Php10.30 million. Moreover, the Philippine had experienced a decline in the current prices of well milled rice by 4.59% and real prices of well milled rice by 8.12% amid the implementation of RTL.

## Keywords

Rice Tarrification Law, Rice Reform, Consumer Prices, Farmers

# Accuracy of Lumped Plasticity Model for Estimating Cyclic Response of Reinforced Concrete Frames

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## Abstract

The lumped plasticity model has been widely used for the nonlinear analysis of structures due to its simplicity, established guideline in seismic design codes, and less computational effort. However, it has been shown that the accuracy of the lumped plasticity model depends significantly on the plastic hinges' properties. In this study, the nonlinear behaviours of two similar RC frames but with two different reinforcing detailing were simulated using the lumped plasticity model and the results were compared with those obtained from the conducted experiments on the frames. The effects of using different plastic hinge models and effective stiffness values were investigated. It was observed that the employed plastic hinge models had insignificant effect on the frames' ultimate loads and all were able to estimate the ultimate loads accurately. However, the models underestimated the displacements corresponding to the ultimate loads of the frames.

## Keywords

Cyclic Response, Nonlinear Analysis, Plasticity Model, Reinforced Concrete Frames

# Development of Novel Locking Plate System for Greater Tuberosity Humerus Fracture Base on Biomechanical Analysis of Locking Plate Fixation System by Finite Element Method

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## Abstract

This paper presents a Finite Element Method (FEM) analysis of a new locking plate designed for the treatment of greater tuberosity fractures of the humerus. The analysis was conducted based on the biomechanical properties of the proximal humerus locking plate (PHILOS), a commonly used implant for this type of fracture. The FEM model was used to evaluate the mechanical behavior of the new plate design under natural loading conditions and compared to the PHILOS plate. The results indicate that the new locking plate exhibits comparable or non-inferior mechanical properties, including stiffness and stress concentration, but smaller and shorter than the PHILOS plate system. These findings suggest that the new plate design is more specifically tailored to the treatment of greater tuberosity fractures of the humerus than PHILOS plate system and may offer advantages in surgical technique and outcome. This new locking plate could be a viable alternative for the treatment of greater tuberosity fractures.

## Keywords

Novel Locking Plate System, Biomechanical, Finite Element Method

# Apples Decay Classification System Based on Image Processing

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## Abstract

Apples are one of the fruits that are widely consumed by the people of Indonesia. Not all areas in Indonesia are suitable for growing apples, apple plants will grow and produce well on land with an altitude of 700 - 1,200 meters above sea level (asl), with temperatures ranging from 16 0 - 25 0 C. There are three largest apple producing areas namely Pasuruan, Malang and Batu City. These three regions are the largest suppliers of apples in various regions in Indonesia, to keep apples fresh until they reach the hands of consumers, after the apples are picked they must be distributed immediately, but the process of sorting apples takes quite a lot of time if done manually, deep technology learning is able to overcome this problem. This study aims to test the accuracy of detecting fresh and rotten apple objects using the Tensorflow Lite framework with the EfficientDet Lite 2 model architecture , fruit detection is tested through an android device in real time to assess the performance of the detection model. The test results show the average detection accuracy of fresh apples is 91.02% and 88.07% for the detection of rotten apples, this indicates that the detection model works quite well on android devices.

## Keywords

Apples Fruit Detector, TensorFlow Lite, EfficientDet Lite 2, Deep Learning, Accuracy

# Food Waste Reduction Strategy in the Food Service Sector in Jakarta with Causal Loop Analysis

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## Abstract

The need for food continues to increase along with the increase in world population. However, problems in environmental, social and economic aspects arise because some of the food will end up being wasted, in fact, this food waste is produced at every stage in the food supply chain. This problem needs to be of concern to both the government as a regulator and business actors as operators and the public as consumers. Based on research conducted by the Ministry of National Development Planning, the proportion of food waste is mostly generated at the consumption stage. The consumption stage is divided by two actors, food service and households. This paper focuses on discussing the generation of food waste in food services in Jakarta using a causal loop analysis. This study aims to propose a strategy for managing food waste in the food service sector. Causal loop analysis provides an understanding of the flow of food waste generation and the relationship between variables that affect food waste generation. The causal loop diagram provides an overview of the generation of food waste generated from three sources: food suppliers, food services and food banks. Three scenarios are implemented to reduce the level of food waste generation.

## Keywords

Causal Loop Analysis, Food Service, Food Waste, Waste Generation



# LoRaWAN: Solution for Monitoring Differential Pressure Room in Pharmaceutical Industry

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## Abstract

The air conditioning system is a process continuous air control of air temperature, air humidity, air cleanliness, air quality, speed indoor air, air distribution evenly throughout the room as well control the noise that can caused by the air conditioning equipment itself according to the needs and conditions wanted especially in drug factories. In This research we use IoT Teknologi to provide system to monitoring Differential Pressure room in Pharmaceutical room based on LoRaWAN. LoRaWAN is one of the LPWAN technologies which also provides a wide range of coverage, low power, and low cost in the implementation. The result of this study are very satisfactory, it can be seen that the results of the LoRaWAN implementation are very good with an indication of the worst RSSI value of -91 dbm and an error value on the Differential Pressure sensor device of 0.65 Pascal.

## Keywords

LoRaWAN, Pharmaceutical Industry, Monitoring, Internet of Things, IoT, Differential Pressure

# Student Affairs in Nigerian Higher Education: Examining the Program and the Profession

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## Abstract

The Student Affairs Division is a necessity in every higher education institution. Having existed for decades, the division continues to prove its relevance in the higher education system. Currently, the Student Affairs Division has become a solid professional body because of its firm integration into the higher education systems of various countries. However, while the student affairs division has been firmly integrated into the higher education system of many countries, some still face challenges in strengthening the foundation and effectiveness of the division. As a result, the students and the institutions in the deficient countries suffer ripple effects in the form of social vices, ill health, terminated dreams, campus cult, and associated implications. This paper explores the student affairs program and professional practice in Nigeria. It examines the effects, lapses, and challenges of this division in the Nigerian higher education system relative to the American educational system to which the student affairs division owes its origin. The paper finally suggests plausible ways to firmly improve the functionality of the student affairs division in Nigeria so as to effectively meet the respective needs of students and institutions while simultaneously maintaining order in the higher education system.

## Keywords

Student Affairs, Higher Education Administration, Practice Versus Profession, Counseling and Career Services, Institutional Values, Campus Culture

# Teaching Folk Dances: The Challenges Faced by Public Elementary Teachers in District 4 of the City Schools Division of Las Pinas

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## Abstract

The educational foundation of teachers has an impact on the way they teach and the depth of their teaching. Several factors can attribute to the challenges that teachers were facing in teaching folk dances to children. One, children were no longer exposed to folk dances at home, school, and in the community. Also, the teacher's readiness to teach create meaningful learning for the pupils.

The purpose of this study was to investigate the contributing factors experienced by public elementary teachers in District 4 of the City Schools Division of Las Pinas" in teaching folk dances to pupils.

This study analyzed the teachers' responses and found out that teachers were not confident to teach folk dance due to the following factors: there was no proper training on how to teach folk dance; elementary MAPEH teachers were generalists; insufficient knowledge of folk-dance terminologies and identifying folk dances; inadequate skills in performing folk dance steps and interpreting folk dance literature when teaching the dance.

## Keywords

Folk Dance, Dance, Elementary Teachers, Schools

# A Study on Competitive Strategy and Vegetarian Restaurants' Performance in Indonesia: Mediation Impact of Customer Loyalty

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### Abstract

This study investigates the impact of customer loyalty on the competitive strategy and performance of vegetarian restaurants in Indonesia. Customer loyalty is one of the company's unique assets. There is a demand from restaurant management to divert business strategy towards preserving and increasing customer loyalty, which improves the restaurant's performance. The method used to obtain primary data was distributing Likert-Scale questionnaires to vegetarian restaurants affiliated with IVS and VSI. Two hundred twenty-four respondents were involved in this study. SmartPLS 3.2.9 was used for data analysis using Path Analysis. The research results have shown a positive and significant effect of innovation differentiation strategy, marketing differentiation strategy, and low-cost strategy on customer loyalty towards vegetarian restaurants in Indonesia. Customer loyalty significantly positively impacts the operational performance of vegetarian restaurants in Indonesia. Customer loyalty also mediates the effect of innovation differentiation strategy, marketing differentiation strategy, and low-cost strategy on company performance, respectively. The competitive strategy comprises innovation differentiation, marketing differentiation, and cost reduction strategies toward the operational performance of vegetarian restaurants in Indonesia.

### Keywords

Competitive Strategy, Customer Loyalty, Operational Performance, Vegetarian Restaurant

# **An Evaluation of Students' Performance, Implemented Students Immersion and Faculty Qualification of Northwestern University (NWU): Inputs for Proposed Pre-Baccalaureate Maritime Track Curriculum Enhancement**

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## **Abstract**

This descriptive study purposed to provide recommendations for curriculum enhancement by evaluating and correlating the academic performances of pre baccalaureate maritime track students and their undergoing of work immersion. Moreover, this study determined the status of qualifications of the faculty members of Northwestern University who are teaching maritime specialized courses and the 80-hour work immersion to their compliance to the prescribed Department of Education (DepEd) and Maritime Industry Authority (MARINA) standards. It was found out that about 80 to 85 percent of the 67 students enrolled in PBMS are satisfactory in their academic performances with regards to the specialized maritime courses including their work immersion. It was evaluated as well that their performance to two of the specialized maritime courses do not significantly correlate with their work immersion except for the subject Maritime Safety. This high percentage of satisfactory performance can be influenced by having faculty members who are highly qualified on the basis of standards set by DepEd and MARINA. It was then recommended that NWU should provide adequate enhancement programs both to the students and faculty to maintain or improve this high satisfactory rate and high quality faculty members.

## **Keywords**

Maritime, Pre Baccalaureate Maritime Track, Work Immersion, Marina

# Coding Estimation based on Rate Distortion Control of H.264 Encoded Videos for Low Latency Applications

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## Abstract

In the field of video processing, advancements in video compression at various temporal and spatial resolutions which are needed in our research to quantify estimation of video quality whereabouts within spatial and temporal domain itself. It was necessary in our research to study the impacts of related video coding conditions upon perceptual quality due to issue raised by User Experience community regarding poor coding. But most of research studies are concerned with coding distortions affected by mostly due to poor coding which address high spatio-temporal resolutions. This paper presents overall 120 test scenarios for video sequences having low spatial and temporal spectral information were studied at [4]. Finally we concluded that even after achieving consistency within subjective scores, we got relevant data consistency after refining subjective scores, so it is not poor coding its due channel capacity which was traced out by rate distortion control.

## Keywords

HVS, DCT, SSCQ, ITU, H.264, QoE



# Effect of Drying Temperature on Colour Change of Green Banana Flour Under Infrared Radiation Heating

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## Abstract

The visual appearance of flour is one factor that influences consumer choice in several ways, this study was to investigate the effects of three drying temperatures (55°C, 60°C and 65°C) on the colour attributes of green banana flour and process variables. Experiments were conducted using far-infrared power of 3000 watts, drying process reduced the moisture content down to between 10 and 12 % d.b. The CIE L\*a\*b\* system was employed to define the colour parameters. These parameters were used to calculate the hue angle ( $^{\circ}h$ ), browning index, chroma, and total colour change ( $\Delta E^*$ ). The L\* value decreased, while the trend of a\* and b\* values increased with the increase in temperature. The lowest overall colour change occurred with a drying temperature of 65°C, then 60°C, and finally 55°C, with a drying time of 210, 300, and 330 minutes, respectively. The lowest lightness was produced by drying at 65°C, which resulted in a browner product colour than the other drying temperatures and the highest browning index due to the partial Maillard reaction that may have occurred due to high amounts of starch and protein, including the high temperatures.

## Keywords

Drying Temperature, Colour, Green Banana Flour, IR Heating

# Economic Viability of Solar Photovoltaic Water Pump for Sustainable Agriculture Growth in Ban don toom, Mahasarakham province

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### Abstract

Mahasarakham is an agricultural province where the total land area is utilized for the cultivation of crops. But this sector is drastically affected by the energy crisis currently worrying the whole world. The research presents solar technology utilization for sustainable growth of the agriculture sector of Mahasarakham is presented. Water pumping is a major energy-consuming operation of the agriculture field that may be shifted to solar energy-based electricity. This work elaborates on the economic feasibility of PV solar-powered water pump systems. Solar PV water pump system viability is estimated based on economic determinants like NPV and payback periods. Simulation outcomes predict that installing a single 3 kW, DC-solar PV water pump will result in 8 MWH electric power savings and greenhouse gas emission reduction produced due to fuel combustion for generating base-case electric power. Commercial implementation of solar PV water pumping technology can be a milestone in figuring out energy and economy-related agricultural issues and reducing environmental concerns. The results showed that the operating time of the highly efficient solar pumping system is at 2 p.m., and the measured water volume is 14,400 liters per hour. The knowledge and understanding assessment results before and after transferring knowledge to the community in the use and maintenance of solar pumps showed that the mean scores from the participants' test were. It was found that the mean scores from the training participant assessment form participants were able to use the knowledge from the training at the level of 9.99, most satisfied, the solar pump was found cost-effective and beneficial for horticulture crops as compared to the diesel pump.

### Keywords

Photovoltaic, Water Pumping, Gas Emission

# The Simulation Model for Vehicles to Quick Exit of the University in Rush Hours

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## Abstract

The main objective of this research was to develop simulation model to estimate the waiting time in queue at exit gate at the Phranakhon Rajabhat University, and to determine the influence of geometric and control factors to release congestion at exit gate. The geometric elements were measured including, number of lanes, speed hump and vehicle velocity. The M/M/1 was used to develop the regular model as base tested simulation, the arrival process, the service and departure process, the number of servers, the queuing discipline, the queue capacity, and the size of the client population were collected and determine by observed the vehicles which passed through the Phranakhon Rajabhat University within 3 months period. After regular model developed, 2 traffic management models were added to study in order to decrease the waiting time in queue at exit gate. First, is added by the special lane to main center office near exit gate, second is applied by human to control traffic at exit gate. This research found that the results of waiting time in queue at exit gate by 2 traffic management models were not much different in results, the human control at gate model is perform better because driver on the main road had been afraid of offending and then had held break and let vehicle from the gate to pass through and get into the main road event through the heavy traffic jam on the main road exist. This research found that the results of waiting time in queue at exit gate on Monday and Friday are high due to natural of traffic jam at City of Bangkok where office man came into office at the beginning and ending of the week.

## Keywords

Simulation Model

# Asia's Travel Sector after the Pandemic Situation: Impacts and Revival Strategies

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## Abstract

This work is conceptual research that focuses on both corona virus effects on the Asian tourism industry and potential remedies to the current world crisis. In addition to deliberating alternative revival tactics, this paper aims to analyze how recent pandemic situations have affected the travel and tourism sector globally in Asian countries. Pandemic has a negative economic, financial, and employment impact on the tourism industry and its connected industries based on the literature survey. When a crisis strikes, modified contingencies immediately alert the supporting business units to any potential shocks. The creation of corrective measures is being delayed by the nation. The impact of the crisis declined, continuing in June, July and August of every year. Under traditional circumstances, the arena becomes easier for immigrants, women, students, older staff, not only in big cities but also in remote areas, moreover, rural and coastal areas tend to be economically different. A fragile place that can also limit various options. From the data obtained from published journals and resources, webinars, and business communication, the proposed strategies are categorized based on tourism-related wise purchases, financial ambitions, promotions, providing credit to the tourism industry, bailouts for start-ups, conducting social audits to address the situation, digitalization and focus on the regional market.

## Keywords

Asian Tourism, Market, Digitalization, Covid Pandemic

# Design and Implementation of a Raspberry Pi-based Personal Pet Robot

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## Abstract

This project aims to design and implement a personal pet robot using Raspberry Pi that responds to voice commands and moves using motor wheels. The robot consists of a Raspberry Pi, a motor driver and various sensors such as a microphone and a distance sensor. The Raspberry Pi runs a custom software program and google API's that enables the robot to recognize voice commands and respond accordingly. The motor driver is used to control the movement of the robot's wheels, enabling it to move in different directions and speeds. It also has an oled display that displays custom faces and responds accordingly.

We tested the robot's performance by issuing various voice commands and observing its response. The results of our experiments showed that the robot was able to accurately recognize voice commands and move in the desired direction. We also integrated a distance sensor to prevent the robot from colliding with objects while moving.

Overall, this project demonstrates the potential of using Raspberry Pi to build personal robots that can interact with their owners and perform basic tasks such as moving and responding to voice commands. Future work could focus on expanding the robot's capabilities to include more complex tasks and interactions.

## Keywords

Raspberry Pi, Robot, Pet Robot

# Health and Sanitation Practices and Job Performance Among Hotel and Restaurant Management On-the-Job Trainees

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## Abstract

This survey-correlational study aimed to determine the health and sanitation practices and job performance among the Hotel and Restaurant Management On-the-Job Trainees of Iloilo State College of Fisheries-San Enrique Campus in Iloilo City. Conducted during the academic year 2014-2015, the study utilized 35 randomly selected HRM OJTs to respond to the two standardized instruments, the Health and Sanitation Practices Questionnaire developed by Torreblanca (1990), and the CBM Job Performance Sheet (2010). The findings revealed that, generally, HRM OJTs had excellent job performance and practiced health and sanitation to a full extent. HRM OJTs' three most important health and sanitation practices in terms of cleanliness and grooming were: changing of underwear, taking a bath, and changing of blouse/shirt. In terms of diet and nutrition, their preferred practices were: eating and enjoying meals with family, chewing foods well, and feeling relaxed and happy while eating. Furthermore, in terms of exercise, sleep, rest and relaxation, their chosen practices were: having proper ventilation and lighting for work, having some enjoyable recreations, and sleeping with low pillow or none at all. In terms of medical and dental health, they practiced brushing of teeth properly, taking medicines as directed, and using dental floss or thread to clean teeth. HRM OJTs did not differ significantly in their health and sanitation practices and their level of job performance when they were classified according to sex and age. Finally, the study revealed that no significant relationship existed between the health and sanitation practices and job performance of HRM OJTs.

## Keywords

Health, Sanitation Practices, Job Performance



# The Influence Factors of the Implementation of Power Plant Asset Management at PT PLN Group Indonesia

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## Abstract

The development of the implementation of industry 4.0 in Indonesia has had a significant movement in the past few years. One evidence of this implementation is the rapid growth rate of digital transformation in both the economic and non-economic sectors driven by the occurrence of COVID-19. In line with the growth of digital activities in Indonesia, the need for public electricity supply is also growing and will continue to accelerate in the future. Recognizing the opportunities arising from industry 4.0 and the need for equitable availability of electricity in Indonesia, PT PLN (Persero) set an object to encourage all its power generator units and subsidiaries to achieve optimal performance results during the use of asset management as a tool in supporting the production and availability of electricity in a sustainable manner.

As the first asset management implementer who has successfully implemented the power plant asset management in their organization, PT Pembangkit Jawa-Bali or PJB, has endeavored to compile and share its practical methods to all power generator units and subsidiaries owned by PT PLN Group. This step was taken in order to help all the members of organization have the same performance optimization achievement after implementing the power plant asset management. As a result of these practices (from 2005 to 2021), there are three variant groups of implementation results that have been found, namely: successful, almost successful, and failed. According to it, the research aims to find the determinant factors of this implementation process from each power generator unit and subsidiary. The researchers use qualitative research method to gain more data by conducting deep interview with respondents.

After collecting and processing the data, the researchers found that there are six determinant factors that affect the result of the implementation process at all power generator units and subsidiaries. Those factors are policies, the competence of human resources, commitment, transfer of knowledge, technology, and finance. In conclusion, PT PLN Group can achieve its objective if they are focusing on doing some improvements to the six determinant factors in the organization.

## Keywords

Industry 4.0, Power Plant Asset Management, PT PLN Group, The Competence of Human Resources, Commitment, Transfer of Knowledge, Technology, Finance

# Paperless Digital Memorandum Distribution with Short Messaging Service (SMS) Notification

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## Abstract

The study aimed to develop a Paperless Digital Memorandum Distribution with Short Messaging Service (SMS) Notification that can be beneficial to the faculty, staff, and administrators of the Iloilo State College of Fisheries. The system was developed to augment the work-from-home scheme during the pandemic specifically in the distribution of memorandum issued by the College President in a real-time and paperless way. The memorandum will be disseminated to the specific recipient using SMS notification and can be viewed online thru email. The additional feature of the system includes managing a user and memorandum as well as printing of reports. The researcher utilized the Agile Development Model in designing the system.

The evaluation of data was analyzed using the mean. The overall results of the evaluation based on product quality and quality in the use of the developed system for the Paperless Digital Memorandum Distribution with Short Messaging Service (SMS) Notification show that it has a grand mean of 4.5 which has a descriptive meaning of excellent.

The result likewise revealed that the product quality of the system was excellent as to its functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. Finally, the system's quality in use evaluation result was excellent as to its effectiveness, efficiency, satisfaction, freedom from risk, and context coverage.

## Keywords

Digital Memorandum, SMS Notification, Memorandum Distribution, Paperless

# Bill and Reading Bus Ticket App

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## Abstract

This study aimed to develop a Bill and Reading Bus Ticket App. The system was developed for the benefit of Bus conductors specifically in ticketing to the commuters using a mobile app and send records to its data center. The ticket can be electronically produced by using the android mobile app and Bluetooth thermal printer. Its features allow users to store and manage location details and fare rate. The system can provide report according to its conductor and bus. The system has three (3) user types, the Administrator, the Conductor and the Inspector. The researcher utilized the System Prototyping Methodology in designing the system.

The researcher used Apache Cordova for android developing, C#.net for desktop server developing, SQLITE (Local Database) and XAMPP MySql (Database Server) as the backend in developing.

After the development, the system was evaluated using International Organization for Standardization/ International Electrotechnical Commission (ISO / IEC) 25010:2011 standard for the evaluation of software quality in terms of product quality and quality in use.

The evaluators were composing of five (5) Drivers; Four (4) IT experts, and Ten (10) Conductors.

The result likewise revealed that the product quality of the system in the evaluation of the system's functional suitability with the description meaning of "effective". As to performance efficiency, usability, security, maintainability and portability of the developed system, the overall results showed which has a descriptive meaning of "very effective". Finally, the system's quality in use of evaluation result was excellent as to its effectiveness, efficiency, satisfaction, freedom from risk and context coverage.

## Keywords

Bill and Reading, Bus Ticket, Mobile App

# Prediction of Student Academic Performance using Linear Regression

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## Abstract

Academic assessment is based on providing instant and specific feedback after each learning step to avoid unnecessary delays in correcting students' errors. For such type of evaluation to realize its maximum benefit, it is suggested that assessment should not be a once-and-done activity. Rather, it must be a continuous act, which guides the teaching-learning process of provision for timely feedback. The Machine Learning Algorithm using linear regression was developed to Predict Student Performance probability rate to complete the course taken. It also provides students with information such as ID number, course, year and grades. The demographic data were used for personal, financial and psychological information, family background and health record. The respondents of the study are Student Affairs personnel, IT Experts, and students coming from different departments. This study used the Prototyping Model as a guide in developing the application. To evaluate the application, McCall's Quality Model was applied. The mean was used to analyze the data. In terms of system operation, system revision and system transition criteria all mean equivalents for each characteristic were described as "very effective". Based on the result of the study, the researchers concluded that the Machine Learning Algorithm to Predict Student Academic Performance is a big help to the institution, especially to the Office of Student Affairs to predict the probability rate of the student finish their studies and increase student's awareness.

## Keywords

Machine Learning, Linear Regression, Student Academic Performance

# State of Art of H.264 Standards within Supervised and Semi Supervised Learning

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## Abstract

In case of Semi Supervised Learning methods, even hypothetically it's Impossible to combine Speech with Visual Characteristics together. Based on ITU Recommendations, we initially assumed and considered the typical two-dimensional plane. In technical terms it should be Chrominance and Luminance plane. In order to quantify impairments of spatial and temporal domain, firstly it should be based on technical assumptions, i.e, we should do mathematical operations based on spatial information within chrominance plane and temporal information within luminance plane. Secondly colour domain exists between two planes and moreover, Scope of subjective quality assessment is essential towards subjective scores as independent variables. But even independent variables are limited to few concepts, out of limited issue, after investigating Human Visual Characteristics, selectively subjective scores are considered as true values judged by humans and it was traced out because of Peceptual Video quality assessment where reference video is partially available. We concluded that it has good fitness towards proposed method in-terms of correlation coefficient. We concluded that our proposed metric completely understood Human VISual System.

## Keywords

VQM, MOS,ITU-R, H.264, QoE

# Empowerment Development Model for Organic Farmers

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## Abstract

Organic farming in the Philippines is taking a toll in establishing its sustainability in the market due to varying factors. This study determined the adoption of organic farming in the Visayas area, Philippines, A.Y. 2020 with the end view of formulating an empowerment development model for farmers. The study utilized the multi research method with the use of researcher-made questionnaire as the main instrument in data gathering. Both quantitative and qualitative data was used in ascertaining the factors that influenced the adoption of organic farming in Visayas. There were thirty-five (35) respondents who were the farmers from the selected organic farms in Visayas, both in Region VI–Western Visayas and Region VII–Central Visayas. These farms are accredited by a third-party accrediting body of the Department of Agriculture. Convenience sampling technique was used where the participants were selected based on their availability and their willingness to take part of the study. The main instrument used in gathering the data was research-designed and had undergone content validation and pilot testing to ascertain their functionality and reliability. For data analysis weighted mean, chi-square test of independence and One-Way ANOVA. Land size, soil quality, farmer's level of education and labor demand techniques influenced the farmers in adopting organic farming at a moderate extent. The organic farmers moderately practiced soil management, weed control techniques, crop diversification, fertilization, irrigation and harvesting. There is a significant relationship between the type of respondents and the extent of influence of land-size to the farmers toward adopting organic farming and there is also another significant relationship between cooperative membership of the respondents and the extent of influence of labor demand techniques towards the farmer's decision to engage in organic farming. However, there is no significant relationship between the profile of the respondents and the farming practices they employed in their organic farming activity. There is no significant difference between the responses of the respondents on the extent of influence of the factors like land-size, soil quality, farmer's level of education and labor demand techniques to the farmers in their inclination to adopt organic farming and the organic farming practice that used in their organic farming by activity. Despite of a good market opportunity of organic farming, there was just a gradual conversion of the farmers from organic farming to conventional farming even though the country is doing some initiatives to push for the sustainability of organic farming industry. Likewise, the growing demand for organic produce in the market, the farmers in Region VI and VII have shown hesitation towards full adoption and had not applied the ideal farming practices at a maximum level to ensure that their activity addresses the vulnerability of the environment vis-a-vis fulfilling the commitment to provide healthy and nutritious crops to the consumers.

## Keywords

Agriculture Economics, Crop Diversification and Fertilization, Irrigation And Harvesting, Organic Farming



# Inventory Management Analysis of a HomeGrown Coffee Shop Using the System Dynamics Approach

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## Abstract

Inventory management is a method of optimizing the flow of goods in and out of an organization. The objective of inventory management is to get the most benefit from a business inventory with minimal venture costs. It is vital to ensure the business's longevity. In this article, the modeling of the system dynamics pertaining to inventory management was carried out. This study aimed to attain an accurate analysis of the management of the inventory of home-grown coffee shops in terms of sourcing, storing, and to sell coffee – both raw materials and finished goods thereby enabling the company to make inventory related decisions that will benefit the firm. The perennial problem confronting the company lies in the mismanagement of inventories. The results of the study obtained from the methodology applied in this undertaking, was a correct and adequate analysis of the dynamics modeling of a system in inventory management to ensure that the right stock, at the proper levels, and at the right cost, as well as price, is made available to the coffee shop customers. This was attained using the simulation software known as Stella and quantitative methodology-based mathematical calculations. This is a case study of a home-grown coffee shop.

## Keywords

Coffee Shop, Inventory Management, Modeling System Dynamics Approach

# Buy or to buy: An Examining of Shopping Behavior towards Domestic Duty-Free Tourists in China

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### Abstract

Shopping, with a great significant contribution to Hainan's tourism industry income, becomes more and more popular for the domestic tourists in China. On one side, duty-free shopping income takes up more than one third of Hainan's total tourism income in recent passed years, on the other side, duty-free shopping income will increase and take more percentage in the near future year. This paper try to examine the basic shopping behaviour model of the domestic duty-free shopping tourists. Data were collected from 67 respondents by using convenience sampling way. The motivation of duty-free shopping tourists' shopping behavior is divided into five dimensions: goods attributes, shopping destination attributes, tourism elements, purpose and social demanding. Quality, brand, the shortage of specific goods in the international market, low price or cost, convenient payment and other factors are the important factors to stimulate their shopping behavior. The results have at least a significant impact on duty-free product operators and marketers to understand the needs of duty-free product shoppers in China.

### Keywords

Shopping Behavior, Domestic Tourists, Duty-Free Shopping, Hainan

# Developing an Inclusive Education System through Adaptive and Intelligent Web-based Educational Technology

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## Abstract

In recent years, the advancement of educational technology is witnessed in the establishment of smart learning environments. The paper aims at developing an inclusive education system through adaptive and intelligent web-based educational technology. Adopting a qualitative approach for analysis, the paper demonstrates that adaptive and intelligent web-based educational technology can increase inclusivity by providing scope for easily-accessible, self-paced and personalised learning options for students. It also helps in customising instructions and providing effective feedback to students, enhancing engagement within a virtual and remote classroom. In conclusion, the development of such technology can revolutionise the current education system by enhancing inclusivity and a student-centred framework for adaptive learning.

## Keywords

Inclusive Education, Adaptive, Intelligent, Web-Based Educational Technology, Adaptive Learning, AI

# Influence of Teacher Fondness to the Conceptual Understanding of STEM Students of Nazareth School of National University

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## Abstract

Teacher fondness refers to the positive likeness of students toward their teachers, which can increase their engagement in class and improve academic performance. However, the direct influence of teacher fondness on the conceptual understanding of stem students calls for more information and studies conducted. Hence, this study investigates the influence of teacher fondness for STEM students concerning their conceptual understanding. The results of the study highlights themes such as significance of positive communication, effective teaching strategies, and appropriate boundaries between students and teachers, which are crucial in creating positive impacts on teacher-student interactions and academic success. Thus, exploring the long-term impact of teacher fondness and identifying effective strategies for promoting these relationships can enhance students' social-emotional development, career readiness, self-esteem, confidence, and resilience in facing challenges.

## Keywords

Conceptual Understanding, STEM Students, Teacher Fondness

# Flow With Mechanics: A 7E Instructional Material in General Physics 1

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## Abstract

The COVID-19 pandemic has changed the world and has had a profound effect on education. Under the new normal, the learning environment drastically changed and it affected the student's understanding of various school lessons. The researchers developed Flow with Mechanics: A 7E Instructional Material in General Physics 1 to help the learners in coping up with the lessons in this school setup. In developing Flow with Mechanics, the researchers used the ADDIE model. The instructional material is interactive and was based on the 7E Learning Cycle to improve students' critical thinking skills in learning Fluid Mechanics. It was validated by the experts and then implemented on Grade 12 Science, Technology, Engineering, and Mathematics students of Cardona Senior High School. It revealed that Flow with Mechanics: A 7E Instructional Material in General Physics 1 is worth developing, and is effective for use as per the result of the analyses.

## Keywords

COVID-19 Pandemic, Education, 7E, Physics

# Academic Dishonesty in the Online Assessment Tasks of Engineering Students in one of the State Universities in the Philippines

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## Abstract

The covid-19 pandemic affects people all over the world, and one of the most affected areas is the educational system at various colleges and universities. The pandemic has pushed the educational system to a purely online management system that includes assessment activities such as assignments, quizzes, and examinations, as opposed to the traditional face-to-face classroom setup. The abrupt shift to an online setup of these activities has put one of the core values of almost all colleges and universities, Integrity, to the test. This study seeks to identify the factors that contribute to academic dishonesty in the current online educational environment, particularly in the field of engineering education in one of the state universities in the Philippines. It also aims to make recommendations on how to prevent or at least reduce academic dishonesty in online assessment settings. The research study employed exploratory research methodology to investigate the occurrence of academic dishonesty in the current online educational set-up particularly in the field of engineering education in one of the state universities in the Philippines. Out of the 186 student respondents, 160 or 86.02% of the students confessed that they have committed academic dishonesty in one of their online assessment tasks (quiz, exam, assignment, etc.) and 26 or 39.98% of them never committed academic dishonesty. Results shows that checking of notes and lecture handouts is the most common ways they committed academic dishonesty which is 78.13% of the 160 students, while checking of other internet sites during exam, consulting their classmates/someone during exam, and posting of Formulas/Notes in the walls recorded 39.38%, 37.50%, and 36.25% respectively. Fear of failure is the most common personal-intrinsic factor why student engaged in behavioral misconduct which is 73.75% of the 160 students while 61.88% of them choses dissatisfaction with the teaching as the most common extrinsic factor.

## Keywords

Academic Dishonesty, Assessment Tasks, Engineering Education, Integrity, Online Assessment

# Organic Agricultural Discourse in the Highlands and Lowlands. Case Study: Subang Regency, West Java Province

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## Abstract

The disparity in the amount of production and price of rice produced by organic farming in the highlands and lowlands of Subang Regency doesn't make farmers stop producing it. This study aims to analyze organic rice farming in the highlands and lowlands, as well as analyze the factors that cause disparities in organic rice production in the highlands and lowlands. This research is a case study in Sagalaherang and Pringkasap District, Subang, West Java. Farming analysis and comparative case study analysis are the analytical methods used in this study. The results showed that: 1) organic rice production in the highlands is 3.2tons/ha, with an income of IDR17,600,000 and production costs IDR17,706,500, the farming business suffers a loss per season of IDR106,500, Ratio per Cost (R/C) is 0.99 and not making a profit. Rice production in the lowlands is 4 tons/ha, with an income of IDR22,000,000 and production costs IDR14,426,667, the farmer's profit per season is IDR7,573,333, the R/C is 1.52 and the profit rate is 0.48%; 2) several factors causing disparities in production yields in both areas covering geographical location, agro-climate, cultivation techniques, farmer knowledge, use of agricultural tools and machinery, marketing, and institutions. Although the income of farmers in the highlands is quite small, farmers keep choosing organic farming since they know that organic farming is healthy. The central government, regional governments, and farmers must work together to create new market opportunities so that rice produced from organic farming can be optimally absorbed by the market at competitive prices.

## Keywords

Organic Agriculture, Highlands, Lowlands, Farming, Rice



# Biogas Production: A Case Study Behind Multifarm Biogas Facility's Operation in San Fernando, Cebu Philippines

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## Abstract

Developing pig housing facilities integrated with waste treatment, resource recovery, and recycling systems in the Philippines is challenging due to the scarcity of accessible guidelines and environmental pollution control restrictions. Using a comprehensive approach to data collection, including site visits, operator interviews, and analysis of relevant records and reports, this study used IRENA's Biogas Manual for measuring small-scale biogas capacity, and production was used to measure the small-scale biogas capacity and output. The results indicate that the biogas plant had a total waste deposit capacity of 24,088.64 m<sup>3</sup> and utilized the balloon digester and pig waste as feedstock. The average annual waste deposited in the digester is 18,066.48 m<sup>3</sup>, which was lower than the total capacity of the biogas plant by 25%. Additionally, the actual gas produced was only 6,022.16 m<sup>3</sup>, 10.08% lower than the daily capacity. To comply with the Philippine Agricultural Engineering Standard (PAES 413:2001), the facility should review its feedstock content and plant layout and consider hiring a technical expert to improve the biogas plant's efficiency and productivity. The study emphasizes the importance of incorporating integrated waste treatment, resource recovery, and recycling systems with pig housing facilities for biogas facilities' safe and sustainable operation.

## Keywords

Anaerobic Digestion, Biogas System, Capacity, Feedstock, Waste-To-Energy Technology

# Health Risks among Poultry Farm Workers in San Fernando, Philippines

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## Abstract

This study aimed to identify prevalent occupational hazards and health risks among San Fernando, Philippines, poultry farm workers and develop an intervention program to mitigate the risks associated with long-term exposure to these hazards. The study utilized a quantitative, cross-sectional research design with primary data obtained through workplace inspections and employee interactions using the Hazard Identification Risk Assessment methodology and a modified, adapted questionnaire from the study of Rout & Sikdar, 2017. The questionnaire was divided into the respondents' demographic profile and management practices and the hazards the workers were exposed to.

Results showed that eight tasks were associated with 15 hazards, with an 8.6 mean risk rating. The poultry farm lacked strict compliance with proper management practices, particularly in implementing protective equipment, resulting in workers being exposed to numerous hazards that contributed to various types of risk. An intervention scheme was developed to reduce the risks faced by workers. A cost-benefit analysis was conducted, with the computation of the return on investment. The study's findings underscore the importance of implementing proper management practices and protective equipment in poultry farms to ensure the health and safety of workers.

## Keywords

Cost-Benefit Analysis, Hazard Identification, Management Practices, Risk Assessment, Intervention Program

# Nighttime Driving: Driver's Visibility Assessment in Sibonga, Cebu, Philippines

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### **Abstract**

This study assessed drivers' visual perception during a night drive to determine if their driving behavior and skill level differ with and without streetlights and whether Lamacan, Sibonga's current street lighting system along the Sibonga-Dumanjug route, adheres to government standards. A descriptive quantitative design and questionnaire were utilized to gather data. The questionnaire enclosed three parts: respondents' profiles, the DBQ, and DSI administered to 201 drivers determined using the Yamane formula. Data were analyzed using a t-test to determine the significant difference between DSI and DBQ in low illumination with and without streetlights. In assessing the streetlight's current profile, a checklist was utilized.

Results showed that most respondents were male, had over ten years of driving experience, demonstrated awareness of the driving mechanics, and most accidents experienced happened at night. Furthermore, drivers' perception of road brightness' is affected by age; younger drivers experienced brighter visibility than older drivers. Additionally, it revealed a significant difference in driving skills and behavior between drivers with and without streetlights. According to the findings, drivers' perception at night is critical to their driving behavior and skill inventory. Finally, the locale's current streetlight profiles failed to adhere to highway lighting and standard design requirements.

### **Keywords**

Accidents, Driving Behavior, Illuminance, Lux Meter, Skill Inventory

# Identification and Quantification of Waste on Light Bulbs from Households Sources in Southern Cebu, Philippines

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## Abstract

Improper disposal of Lighting Devices, classified as Electrical and Electronic Waste, poses significant risks to the environment and public health. Despite its global impact, this issue is often neglected. To address this concern, we conducted a study in a first-class municipality in southern Cebu to identify and quantify Light Bulb wastes from households using quantitative and descriptive research methods. Our study revealed a significant correlation between household income level and the amount of light bulb waste generated per household, with light-emitting diodes comprising 56.60% of the total waste produced annually. Additionally, we found that the municipality lacks a proper lamp waste disposal system, further exacerbating the hazardous nature of these wastes.

The findings highlight the pressing need for sustainable and responsible Lighting Device waste management to protect the environment and public health. Policymakers, waste management officials, and concerned citizens must take immediate action to address this urgent issue. By acknowledging the potential risks posed by Lighting Device waste and implementing sustainable solutions, we can create a brighter and healthier future for our communities and the environment.

## Keywords

Lamps, Electronics, Devices, Waste, Households

# Assessment on the Perceived Effects of Environmental Noise in an Online Class Setting in SUCs

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## Abstract

Environmental noise is a significant hindrance to students' academic progress, particularly in the current online learning environment where multiple noise factors are present at home. This issue demands urgent attention from schools, parents, and students, working together to identify and mitigate noise factors that may impede academic progress. The WHO's minimum noise level for students to comprehend is often exceeded in many households during virtual classes, making it difficult for students to understand and retain information. Therefore, it is crucial to explore the perceived effects of noise on students during the COVID-19 pandemic, given that the majority of learning now takes place in non-traditional classroom environments.

To investigate this issue, a study was conducted using a descriptive-correlational design, focusing on BSIE students who have experience with online classes. The results showed a significant association between noise level and the kind of material used in the home structure, as well as the number of people in the respondent's home and noise level. The noise level measured from several types of home materials exceeded the WHO minimum noise level for students to understand. These findings provide valuable insights into the relationship between noise levels and house materials, the difference between actual and perceived noise levels, and the primary sources of noise in the home learning environment.

Addressing noise factors that may hinder academic progress is crucial, and these results provide useful information for schools, parents, and students to create a more conducive learning environment for students.

## Keywords

Decibels (dB), Home Learning Environment, Noise Factors, Noise Pollution, Online Class

# Smart Farm Solar Soil and Weather Real Time Monitoring System for Farmers

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### Abstract

Most people in Thailand make most of their money from farming. But it's getting more and more expensive as people move from rural to urban areas where they can make more money in less time. There are many reasons for this. Greatly affecting the efficiency of vegetable crops. both weed problems and inadequate care Therefore, in this research, a real-time soil, solar, and weather monitoring system was created for farmers to enable them to know the actual conditions of their crops and to calculate the correct watering and fertilization. It saves time in agriculture.

From the research, the researcher has set up a program to monitor humidity, temperature, and pH. Then, put the equipment and the screen into the steel box so that it is easy to set up at the vegetable plot. Once the system is set up correctly, farmers can use their own cell phones to look at information about their vegetable plots. The experimental results found that using equipment to monitor the environment of the vegetable plots helped farmers spend less time caring for the plots. Also, the productivity of the vegetable plots that have been set up with this kind of system is good. The researchers tested it with farmers who grew kale. The cultivated kale yielded good yields similar to those of normal kale but took less time. We compared kale growth between kale grown in greenhouses and kale grown outdoors. The results showed that the overall increase in the first period was not different, and the later period of kale grown at the farm showed better growth.

### Keywords

Smart Farm, Thailand Agriculture

# Workplace Safety Level among Furniture Shops in Argao, Cebu, Philippines

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### **Abstract**

Workplace accidents and injuries continue to be a major concern, particularly in industries that involve the use of sharp tools and machinery. However, hazards such as slips and falls, dust, and noise also pose significant risks to workers. This study assessed the level of workplace safety in Argao, Cebu, Philippines, specifically looking at safety practices and rules in furniture shops, the level of safety hazards present in the workplace, and the relationship between safety practices and the safety level of the work environment. The study interviewed 25 respondents using questionnaires and surveys, and the results revealed a high risk of work-related injuries and accidents among workers. Using a Pareto chart analysis, it was determined that 80 percent of the furniture industry's processes in Argao, Cebu required immediate action to control, particularly related to wood slips, trips, and falls. To address these risks, an intervention scheme was developed based on the 5S approach - a lean manufacturing tool to improve workplace conditions and eliminate errors. The results of the study serve as a guide for the local government unit to create an ordinance to promote a safer work environment for workers in the industry.

### **Keywords**

Workplace Safety, Furniture Industry, Risk Reduction, Hazard Prevention, Industrial Performance



# Productivity Assessment of Pesticide Application of Cabbage Production in Mantalongon, Dalaguete, Philippines

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### **Abstract**

Cabbage production is an essential agricultural endeavor that significantly impacts the world's food supply. Yet, if pests and diseases are poorly controlled, they may result in considerable yield losses. One of the most popular tactics cabbage growers use to stop pest and disease outbreaks is pesticide application. This study aims to assess the productivity of pesticide application in cabbage production and to look into the effectiveness and consequences of treating cabbage with pesticides under specific circumstances. To ascertain the relationship between pesticide use and cabbage crop output, this study will look into farmers' pesticide use patterns. The data were collected from a purposively selected cabbage farm. The chosen respondents of this study are the Cabbage Farmers in Mantalongon, Dalaguete, Cebu, Philippines. The data gathered was analyzed using the SPSS, Spearman Rho. The findings of this study imply that using pesticides to control pest and disease outbreaks in cabbage production can be a productive strategy. However, farmers must use pesticides wisely and adopt IPM procedures to increase the yield of their cabbage production. Furthermore, the researchers recommended the implementation of Pest Monitoring Control to locate, identify, and assess the degree of insect infestation for the farms.

### **Keywords**

Integrated Pest Management, Pest and Disease Control, Pest Monitoring Control, Insects and Pest Infestation, Effectiveness of Pesticide

# Impact of Rainfall Variability in Crop Production

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## Abstract

Agriculture plays a critical role in the economy, but the impact of rainfall variability on crop production remains poorly understood. This knowledge gap can hinder the development of effective mitigation and adaptation strategies to mitigate the negative effects of rainfall variability on crop production. This study investigates the impact of rainfall variability on crop production in Mantalongon, Dalaguete, Cebu, Philippines, using a descriptive quantitative research approach. A modified survey questionnaire from Byishimo (2017) was administered to 30 respondents, and the data were analyzed using Simple Percentage, Weighted Mean, and Pearson's  $r$  Correlation and Coefficient.

The results indicated that farmers perceive rainfall variability to have a medium impact on crop production in terms of yield and income. Moreover, the analysis shows that there is an insignificant positive correlation between rainfall variability and crop yield and income at a 0.05 level of significance. These findings suggest that while rainfall variability have a medium impact on crop production, an economic intervention plan should be implemented to minimize further negative impact of rainfall variability on crop production. This plan may prove to be useful in enabling farmers to develop effective strategies to adapt to changing weather patterns and increase their crop yields and income.

## Keywords

Crop Yield, Monthly Income, Low Rainfall, Tropical Area, Rainfed, Rainfall Occurrence, Rainfall Intensity, Rainfall Frequency

# White Corn Production in Argao, Cebu, Philippines

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### **Abstract**

Corn played a vital role in sustaining the needs of society. The study was conducted to determine the current profile and status of white corn growers in Argao as the basis for sustainable production. A descriptive quantitative method was utilized in the study, using a survey questionnaire in the collection of data. The questionnaire was composed of three parts. The first part represents the respondents' profiles and resources. The second part covers the farmers' strategies and problems encountered. The third part was the farmer's recommendation. Questionnaires were administered to 90 respondents selected through the Slovin's formula at a 5% margin of error. Data were analyzed using Two-sample T-test for the relationship between corn production and quantity of fertilizer used, while one-way ANOVA was used to analyze the significant relationship between the type of fertilizer used and white corn production.

Respondents were mostly men (62%), white corn farmers for more than 20 years (36%), most were between the ages of 40 and 60 years old (47%), have an income of less than 5,000 pesos, and have limited access to land, in most cases. The problems farmers encountered mostly were limited financial support, and pest and animal attacks causing the yield to decline. After analyzing the data using the instrument, it was found out that there is a significant relationship between the production and the animal and pest attack. It also found that the financial capability of a farmer has a significant relationship with corn production as well as the fertilizer being used. Therefore farmers especially corn growers in Argao need helps, specifically financial aspects as recommended by them.

### **Keywords**

Agriculture, Corn Pest, Corn Farmers' Population, Crops Productivity, Fertilizer

# Physical Work Environment Assessment on the Handloom Weaving Facility

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## Abstract

The physical work environment is where employees perform their work. This study evaluated if the current conditions of the workplace, namely the lighting, temperature, noise, and layout and design of the facility, are suitable for the weavers, and identified which aspect needs changes. A modified survey questionnaire was used to determine the weaver's perceived condition in their physical work environment. The physical aspects of the facility were measured using Laser Distance Meter, Lux Meter, Sound Level Meter (SL-4010), and Room Temperature Meter. The primary factor that needs attention was identified through Pareto Analysis and comparing the actual measurement to the standards stipulated in OSHA and OSH.

Based on the measurement, the layout and design for the main facility's lowest and highest space were 6 and 162 cm, while for the extension facility were 38 and 178 cm (std. 60cm). The other factors were measured in the morning and afternoon for the main and extension facility, respectively. The lightings were 218.89 and 283.76 lux and 282.42 and 360.53 lux (std. 500 - 1,000 lux). The noise was 72.008 and 75.703 dB, 70.060 and 66.214 dB (std. 90 dBA), while the temperature was 35.08°C and 31.52°C and 34.2°C and 30.45°C (std. 20 - 24.44°C). Therefore, layout and design, lighting, and temperature did not comply with the standards of OSH and OSHA, and these aspects also have weighted mean interval of disagreeable by the workers. Through Pareto Analysis, weavers regard temperature as the primary hindrance to their work performance. Thus, installing equipment that provides thermal and eye comfort, and renovating the facility were recommended to help prevent distraction to the weavers and achieve desired outcomes.

## Keywords

Handloom, Weaving

# Emergence of Extreme Backward Castes (EBCs) Politics in Bihar

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## Abstract

This study attempts to portray the trajectory of the rise and growth of the backward class of Bihar from a historical and political perspective. It will also look into the process of transformation of EBCs from 'Class- in -itself' to 'Class- for- itself'. The Karpoori Thakur Ministry's reservation policy indicates a sea change in the structure of Bihar's political sociology. Despite some hiatus, the coming into power of Lalu Prasad-led JD Government, the process of backward dominance in Bihar's politics accelerated. However, the EBCs failed to keep pace with the OBCs, and a long gap became perceptible between them, though the former also moved ahead. Nitish Government has taken several steps to fill the gap to bring EBCs into the mainstream.

## Keywords

EBCs, Bihar, Indian Government, Backward Caste, Reservation

# Open Distance Learning: A Gateway for Successful Implementation of NEP

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## Abstract

*"Education is the creation of a sound mind in a sound body" – Aristotle, 1984*

Education is a tool for nurturing of mind. Since time immemorial education is one of the significant means in cultivating healthy mind. It is the process of developing skills, knowledge and talents through research, training and experience among learners. The tough times of Covid-19 halted this learning process and had a major impact on learners especially the marginalized classes which resulted in limited or no education for under privileged class. Just as every dark cloud has a silver lining similarly the challenging times of COVID-19 gave rise to the revolutionary concept of open and distance learning; although ODL is not a new concept in the area of education but its applicability and relevance became more prominent during pandemic outbreak. This article is divided into three parts, in the first part the historical evolution of ODL will be discussed. Second part deals with an overview of NEP 2020 and the third section highlights the three E's (effectiveness (Cost), efficiency and equitability) of ODL system. In this article an attempt is made to identify how Open and Distance Learning (ODL) system can reinforce the implementation of National Education Policy-2020 by highlighting three E'S of ODL system namely effectiveness (Cost), efficiency and equity.

## Keywords

Open Distance Learning, New Education Policy, Sustainability, Education

# Intruder Detection in Cognitive Radio Network using Machine Learning Algorithm

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## Abstract

The development of communication and internet has created increase in network size, Cognitive Radio Networks (CRN) developed for effective utilization of Radio spectrum, the radio spectrum shared among primary and secondary users have high possibility of security attacks from malicious users, Security measures must be included in CRN due to the numerous hazards posed by malicious users. The detection of Jamming Attack is verified by applying the proposed IDS based on gradient boosting and further the analysis is made with proposed algorithm based on Gradient boosting and other existing machine learning algorithms that are based on KNN, Decision Tree and Random Forest.

## Keywords

Intruder Detection, Radio Network, Machine Learning, Algorithm, CRN



# The Influence of Human Resource Management Practices on India's Public Sector Enterprises

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## Abstract

Human Resource Management (HRM) in the public sector establishes that HRM is a major influence on different sectors to change in a positive way. Implementation of HRM in the public sectors of India will improve the institutional policies and organisational growth which will help them to improve their position in the market in a global context. In this digital era, the HRM process has been improvised over time and all these have impacted the employees and also impacted the organisation growth of public sectors in India. Thus, in this study, the researcher has discussed all the necessary aspects of HR management in the public sector of India and how HRM practice in the public sector improves the working quality of organisations to establish a better understanding of the research study. Besides that, to improve the quality of the research *secondary qualitative data* has been collected from authentic sources such as newspaper articles, journals and many other resources and thematic analysis has been done throughout the study to improve the quality of the research study.

## Keywords

HRM Practices, Private Sectors, Organisational Growth, Institutional Management

# Energy Modeling of a Hospitality Building – A Case Study

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## Abstract

Energy forecasting and management is an effective solution to enhance energy performance of the existing building. Prediction of energy consumption and its peak demand plays vital role for users to manage their energy consumption more efficiently. ASHRAE standards are used to study prediction of energy consumption of a building. This research carry a Case study on actual hospitality building located in Nagpur region, India. The plan, location and materials required for the prediction calculation has been taken as per the actual building data. The prediction of energy consumption for given building has been calculated by using two methods (manual and Revit software). Revit software is based on radiant time series method (RTSM) given in ASHRAE as well as manual method is cooling load temperature difference method (CLTD). The comparison of the peak demand of energy calculation using two methods on a building is presented in this research to find out optimistic and equivalent method for prediction of energy forecasting.

## Keywords

Energy Forecasting, Cooling Load Temperature Difference Method (CLTD), Radiant Time Series Method (RTSM)

# A Brief Study on the Types of Shuttering and their Comparison

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## Abstract

Shuttering is significantly important activity for concreting. Good quality of shuttering can contribute a great to good quality of concrete. It not only holds the concrete during its wet stage but has many other important functions in this activity of concreting. Bad shuttering has often yielded failures of minor as well as major magnitude. It is also fairly popular as shuttering. Its functional as well as financial share in the entire concreting activity can't be ignored.

Many types of shuttering exist across the globe. Many dimensions are attached to this activity. It is desired to touch upon some normal facts about shuttering in this paper. An effort is made here to bring them before you in understandable manner. Let us begin this small trip of understanding about shuttering which is like a preparation for big journey to concreting.

Lot of people tend to think that shuttering is a semi skilled occupation. To be fair there are a lot of guys who start off as labourers and finish up as shuttering carpenters without any formal training. It is a fair bit of hard manual labour involved, but it is a very tricky job and it takes just as much know how to do it properly as any other jobs in the building trade.

The best form carpenters are ones who plan to strip before they plan to build.

## Keywords

Shuttering, Mould, Timber, Column, GRC

# Community Participation with Further Development of Local Wisdoms Productive to Sustainability

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## Abstract

Community participation includes the opportunity for members of the community and society to participate in activities leading to the development and thus benefiting from development equally. This research address to community participation mechanisms with further development of local wisdom productive to sustainability. A "Key" of community participation with further development of local wisdom productive includes participation in decision-making, participation in operations and development, participation in receiving benefits, and participation in evaluation. Suggestion to management guidelines with further development of organizing activities and forums for exchanging learning, using modern technology to be useful in promoting marketing, having activities that promote assertiveness and allow the community to participate in solving problems and obstacles during carry out activities.

## Keywords

Community Participation, Further Development, Local Wisdom Productive, Sustainability

# Thai's Basic Education: Model of "SMART" Issued to Sustainable Educational Management

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## Abstract

Educational management is the ability of administrators a driving efficiency and quality goals. This is to provide an overview of to model of "SMART" issued to sustainable educational management. The study employed a qualitative by documentary study, and interview questionnaire to multi-contextual and cultural perspectives of 225 key informants such as educational administrators under Thai's basic education, Thailand. In addition, the model of "SMART" issued to sustainable educational management was to sustainable, management and morality, achievement, role and responsibility, and technology.

## Keywords

Model of "SMART", Sustainable, Educational Management, Thai's Basic Education

# Surface Hydrologic Modeling and Analyzing Watershed Hydrologic Response to Land Cover Change and Climate Change

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## Abstract

We are experiencing unprecedented environmental degradation accompanied by complex interactions between urbanization and global environment and climate change on the lives of natives of a particular geographical region influences the overall health status of an individual increasing our understanding of these interaction will involve more active collaboration between the expert from ecological, social and health science. Health professionals and environmental have a vital contributory role in preventing and reducing the health effect of global environmental change.

Urban flooding is the most frequently occurring disaster in rapidly urbanizing cities. Rapid urbanization in general, is characterized by an increase in the total impervious surface area, which means less soil cover for the storm water to infiltrate and a greater volume of runoff from the area in case of a storm event. This increased volume of surface runoff, if not drained, results in urban flooding. Urban flooding can cause serious economic and environmental damages by disrupting transportation and spreading pollution. It is therefore, essential to understand the cause, behavior and effects of urban flooding so as to minimize the risks and costs associated with urban floods. This research provides an insight into surface hydrologic modeling. It also provides an overview of calibration against DEM resolution and hydraulic conductivity values. Finally, it provides an understanding of watershed hydrologic response to different land covers with various Manning's roughness value.

## Keywords

Hydrologic Modeling, Climate Change, Urban flooding

# Management Practices Towards Reduction of Risks among Hotels in Iloilo City

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## Abstract

Risk Management is an important tool for sustaining tourism destinations' image. Accommodation sectors are key players in the distribution of tourism services that is why it is crucial to reduce risks in order to create a long-term visitor and guest engagement. Conducted December 2018, this descriptive study utilizes 324 randomly selected hotel employees in Iloilo City. The Comprehensive- hotel- resort Risk Management Survey was adapted to measure the participants' assessment towards risk management practices developed by Verma (2006). Frequency counts, rank, percentage analyses, mean scores, and standard deviations were employed as descriptive statistics; while the t-test for independent samples and one-way ANOVA, were employed as inferential statistics.

The criterion for the acceptance or rejection of the null hypothesis was set at .05 alpha level. The study revealed that most of the participants assessed the risk management practices of hotels in Iloilo City in the areas of Perimeter and Location, Vehicle Controls, Access Control Procedures, Security of Public Areas, Room Safety and Security, Plans and Preparedness; Fire Safety and Management Leadership as "very highly practiced." The t-test revealed no significant differences in the management practices towards reduction of risks when they were classified according to sex. Likewise, the One-way ANOVA revealed that no significant differences existed in the participants' assessment of risks when they were categorized as to age and educational attainment.

However, a significant difference existed between the participants' assessment in the management practices towards reduction of risks when they were categorized according to hotel classification. Therefore, the null hypothesis must be rejected.

## Keywords

Management Practices, Reduction of Risks, Risk Management, Tourism, Tourist Destinations, Descriptive-Survey, Iloilo City



# MM-Morph: A Computational Linguistic Tool for Morphological Analysis and Generation of Myanmar Nouns

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## Abstract

The Myanmar language belongs to the Sino-Tibetan language family and is morphologically rich. Creating a computational linguistic tool for the Myanmar language is a tough challenge due to its agglutinative nature and complexity in morphological occurrences. This tool combines two essential computational linguistic programs to identify the stems, affixes, and grammatical structures of words to generate new words, i.e., their lexical forms and surface forms. This tool is created as part of the “Morphological Analysis and Generation for Myanmar Language with Finite State Techniques” research. We developed the MM-Morph, a computational linguistic tool for the morphological analyzer and generator of Myanmar nouns, using the FOMA tool, a more sophisticated version of Xerox’s finite state toolset, and some programming languages. To develop the transducer, a lexicon of root words was semi-automatically extracted from the freely available mypos-ver.3.0 corpus and some dictionaries. The morphotactics of the language was implemented manually in the LEXC formalism. According to system evaluation, MM-Morph can recognize more than 82.24% of the nouns in the Myanmar language. The system’s accuracy relies on grouping words according to the in-depth linguistic definitions and defining the correct morphotactic rules. To the best of our knowledge, the MM-Morph: a computational linguistic tool, is the first implementation of the morphology of Myanmar nouns.

## Keywords

Morphology, Natural Language Processing, FST, MM-Morph FSA, Morphological analysis and generation

(MAG), Computational Linguistic tool, Indian Languages, Myanmar Language, XEROX’s XFST, OpenFST, HFST, FST, SFST, Apertium, FOMA

## 1. INTRODUCTION

Morphological Analysis and Generation (MAG) is mainly concerned with the analysis of word formation, identification of grammatical parts inside words, and generation of words in accordance with morphotactic norms. Morphological Analysis and Generation (MAG) for low-resourced language like Myanmar is a critical step in any natural language processing tasks such as speech recognition, lemmatization, POS tagging, spell checking, grammar checking, machine translation, text summarization, word sense disambiguation, information extraction, and search engines. Creating computational linguistic tools for the Myanmar language is a difficult endeavor due to its agglutinative nature and complexity in morphological occurrences. The morphological analyzer and generator are the two crucial linguistic tools that can recognize the stems, affixes, and grammatical structures of words to generate new words, i.e., their lexical forms and surface forms. In this study, we developed MM-Morph, a computational linguistic tool for Myanmar nouns that can analyze the words, extract linguistic features, and generate different words depending on their linguistic features.

The body of this paper is arranged as follows. We review the related efforts made by researchers to implement morphological analysis and generation for the different languages in section (2). We describe the basic concepts of our approach in section (3). We explore some linguistic aspects of the morphology of Myanmar

nouns in section (4). We present the implementation of MM-Morph in section (5). In section (6), we used a test set to evaluate the system. The study is concluded with a few summaries of the future works.

## II. RELATED WORK

Many researchers have successfully created this linguistic tool for many other languages based on different popular techniques. Corpus-based machine learning methods ( Pawar et al., 2022 [1]; Goldsmith (2005) [2]; Viraj Welgama et al., (2013) [3]; John Lee (2008) [4]; Anand Kumar et al., (2010) [5]; Canasai Kruengkrai et al., (2006) [6]; Jedrzejowicz et al., (2005) [9]; Bakaev et al., (2021) [10]), paradigm-based methods (Antony P. J, (2010) [7]; Shah D.N et al., (2020) [8]), Finite State Automata (FSA) based techniques, Finite State Transducers (FST) based techniques (Keleg et al., (2020) [11], Ammari et al., (2021) [12], Zueva et al., (2020) [13], Mirzanur Rahman et al., (2015) [14], Abebe et al., (2018) [15]; Kengatharaiyer et al., (2019) [16]; K Sarveswaran et al., (2019) [17][18]; Fridah Katushemerewe et al., (2010) [18]), Suffix stripping (Sarmah et al., (2019) [19]; Debbarma et al., (2012) [20]), DAWG (Directed Acrylic Word Graph) (Sgarbas et al., (2000) [21]) are popular successful methods reported in the literature. We have already published our review paper about these techniques. We found that the morphological analyzer and generator for highly agglutinative inflectional languages are most efficiently developed using finite-state transducer-based techniques.

## III. THEORETICAL BACKGROUND

For phonological and morphological analysis in natural language processing research and applications, finite-state transducers are frequently used. Ronald Kaplan, Lauri Karttunen, Martin Kay, and Kimmo Koskenniemi are pioneers in this subject. A finite-state transducer is an advanced version of a finite automaton. Its purpose is not only to accept strings or languages but also to transform input strings into output strings. For example, if a string as an input (ကလေးမများ) is given, it produces a corresponding output (ကလေး+NOUN+FEM+PL). Formally, A Finite State Transducer (FST) has six parameters

$$T = (Q, \theta, \Gamma, \delta, s, \gamma)$$

Where,

- $Q$  is a finite set of states,
- $\theta$  is a finite set of input string, (or) word form for Myanmar words (e.g.  $\theta = \{\text{ကလေး}, \text{အိမ်}, \dots\}$ )
- $\Gamma$  is a finite set of output string, (e.g.  $\Gamma = \{+N, +PL, +SG,$

...})

- $\delta: Q \times \theta \rightarrow 2Q$  is the transition function,

- $s \in Q$  is the start state.

- $\gamma$ : is the final state.

A mathematical model of the Myanmar language's morphotactics rules as a finite set of input symbols can be presented as the following formula.

$$\theta = \{\sum_{i=0}^n px_i\} + R + \{\sum_{i=0}^n qx_i\} + \{\sum_{i=0}^n sx_i\}$$

Where,  $\theta$  represents input word form,  $R$  for root word,  $px$  for prefixes,  $qx$  for infixes and  $sx$  for suffixes.

Various finite-state tools are available for building and manipulating large-scale finite-state natural language systems. The FOMA tools, an advanced version of the Xerox finite-state toolset, are used to implement the algorithms.

## IV. MORPHOLOGY OF MYANMAR NOUNS

Myanmar language is the official language of Myanmar and is used by nearly 40 million people. Myanmar Language belongs to the Sino-Tibetan language family and is morphologically rich. Words can be divided into two classes of morphemes called roots and affixes. The roots, also called free morphemes, are the "main " morphemes of the word, indicating a particular meaning, while the bound morphemes also called the affixes which, help to transform a single word into various kinds of words. Myanmar language is an agglutinative language and word forms can be generated from root words by adding affixes. Many word forms can be generated from a single root word using derivational and inflectional morphemes. Morphemes are added to the root words by the morphotactic rules of the language. In forming a word, attaching one suffix to another, or "concatenative morphotactic", is a main productive element of Myanmar's grammar. Myanmar language has only two main types of words: nouns and verbs. By attaching suffixes to nouns or verbs, adjectives or adverbs are derived. The following diagram shows the two classes of morphemes and sub-categories:

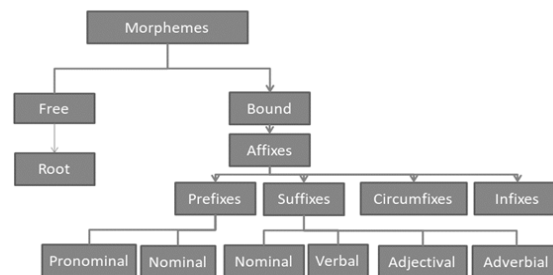


Figure 1: Types of morphemes

In Myanmar Language, affixes can be divided into two groups, viz. nominal affixes, and verbal affixes. The following table shows the list of nominal affixes and their morphological tags.

**Table 1: The list of nominal affixes and their morphological tags**

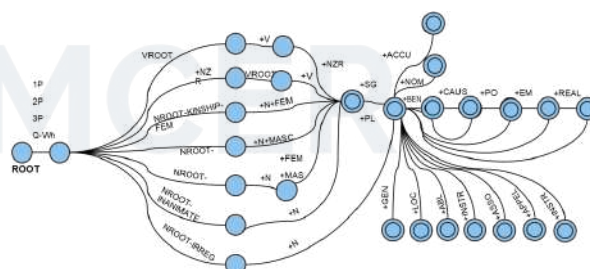
Affixes Category	Affixes Names	Morphological tags	Multi char Symbol
Number	Singular	SG	+SG
	Plural	PL	+PL
Gender	Masculine	MASC	+MASC
	Feminine	FEM	+FEM
Case	Nominative	NOM	+NOM
	Instrumental	INSTR	+INSTR
	Accusative	ACC	+ACC
	Dative	DAT	+DAT
	Genitive/Possessive	GEN	+GEN
	Causative	CAUS	+CAUS
	Locative	LOC	+LOC
	Ablative	ABL	+ABL
	Associative	ASSO	+ASSO
Question Final Marker Particles	Connective	CON	+CON
	Inquisitive	INQ	+INQ
	Interrogative Definitive	INTERO DEF	+INTERO DEF
	Subjunctive	SUBJUNC	+SUBJUNC
	Emphatic	EMPH	+EMPH
	Distributive	DISTR	+DISTR
	Classifier	CLASS	+CLASS
	Matter	MAT	+MAT
	Limit	LIM	+LIM
	Manner	MAM	+MAM
	Substitution	SUBT	+SUBT
	Addition	ADD	+ADD
	Realis	REAL	+REAL
	Purpose	PURP	+PURP
	Polite	POL	+POL
	Benefactive	BEN	+BEN
	Quotation Mark	QUOT	+QUOT
	Reciprocal	RECIP	+RECIP
	Subordinate	SUBORD	+SUBORD
	Honorific	HON	+HON
	Comparison	COMP	+COMP
	Measure	MSR	+MSR
	Identity	IDEN	+IDEN
	Topic	TOP	+TOP
	Appellative	APPEL	+APPEL
	Euphonic	EUPH	+EUPH
Pronominal Marker	Pronominal	PRONOM	+PRONOM
	Q-Wh	Q-WH	+Q-WH
	Demonstrative	DEMO	+DEMO
	Distal	DIST	+DIST
Nominalizer	Nominalizer	NZR	+NZR

Most of the affixes in the Myanmar language are suffixes. Myanmar nouns can be divided into four categories: free nouns, bound nouns, derived nouns, and compound nouns. Free nouns can be classified into three groups: animate nouns for living things, inanimate for nonliving things i.e., objects and materials, and irregular nouns for unique names. These four groups inflect for case, number, etc., but the inanimate nouns

do not reflect gender. Myanmar nouns have only a few nominal bound roots which take pronominal prefixes for making first, the second, or third person in case of kinship terms, and procession of animal body parts. The following table shows some examples of the four categories of nouns.

**Table 2: Examples of the morphotactics of the four categories of Myanmar nouns with some inflected and derived forms.**

Type	Morphological tags (Lexical Form)	Surface Form
Free root -inanimate -animate	အိမ် +NOUN+SG	အိမ်
	ကလေး +NOUN+MASC+PL	ကလေးများ
	ကလေး +NOUN+FEM+PL+GEN	ကလေးများအတွက်
	ကလေး +NOUN+FEM+PL+BEN+CAUS+POL	ကလေးများအတွက်ကြောင့်ပါ
	ချင်းတွင်းမြစ် +NOUN+GEN	ချင်းတွင်းမြစ်၏
-irregular Bound root	1P + အဖေ +NOUN+FEM+SG	ငါ့အဖေ
	3P + အဖေ +NOUN+MASC+SG	သူ့အဖေ
Derived	NZR+ချစ်+V+NOUN	အချစ်
	ကြည့်+V+NZR+NOUN	ကြည့်စရာ
Compound	သောက်ရေဆိုး + VERB+NOUN+NOUN+NZR+SG	သောက်ရေဆိုး



**Figure 2: Finite state representation of inflectional and derivational morphotactics for Myanmar nouns.**

## V. IMPLEMENTATION OF THE MM-MORPH

The morphological analyzer and generator are two essential computational programs that can identify words' stems, affixes, and grammatical structures to generate new words, i.e., their lexical forms and surface forms. Every MAG process comprises three main parts: morpheme lexicon, set of morphotactic or orthographic rules, and decision algorithms. To develop the FST-based tool, a lexicon of root words was semi-automatically extracted from the freely available mypos-ver.3.0 corpus and some dictionaries. The morphotactics of the language was implemented manually in the LEXC formalism. FOMA: advanced modified versions of Xerox's XFST tools, are used to build morphological analysis and generation for Myanmar nouns.

The FOMA, a finite-state tool is an efficient, state-of-the-

art 'programming language' to speed up the linguistic development of traditional grammar components such as lexicons, morphotactics rules, etc. The FOMA software, which combines a lexicon compiler called LEXC and FST tool, can specify the required natural-language lexicon and the morphotactic structure of the word in the lexicon. A LEXC source file is produced with a text editor and compiled into a finite-state network. All tags like nouns, verbs, adjectives, affixes, etc., should be declared under the Multichar\_Symbols declaration section. The structure of a lexc file (Fig. 4) can be seen below. The following is the source lexicon written in a text file named mmnouns.lexc (see Figure 5). The result of lexc compilation of a valid input file is a finite transducer. MAG is built by compiling LEXC file in FOMA, a finite state tool set (Fig 5). Sample outputs from the morphological analyzer and generator are shown below (Fig 6).

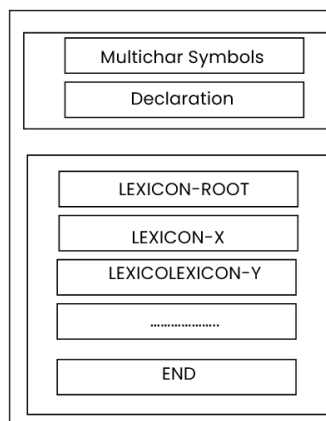


Figure 3: The structure of the LEXC compiler

```

1 Multichar_Symbols +N +V +PastPart +Past
2 +PresPart +3P +SG +1P +NZR+ +PL +BENF +POL
3 +EMPH +REAL +CAUS + +GEN +NOM +ACCU +LOC +ABL
4 +DEMO +Q-Wh +DIST
5
6 LEXICON Root
7
8 ! ဖုန်းတိုက် prefix , suffix မှတ်တမ်း
9
10 +1P:သိ VPREFIX: pronoun မှတ်တမ်း
11 +1P:တစ် VPREFIX:
12 +1P:တစ် VPREFIX:
13 +1P:တစ် VPREFIX:
14 +1P:တစ် VPREFIX:
15 +Q-Wh:ဘယ် VPREFIX:
16 +Q-Wh:ဘယ် VPREFIX:
17 +Q-Wh:ဘယ် VPREFIX:
18
19 +1P:သိ VSUFFIX: pronoun မှတ်တမ်း
20 +1P:သိ VSUFFIX:
21
22
23 ! ဖုန်းတိုက် Noun ထပ်ထည့်မှတ် Noun (၅) ပုံစံများ-----
24
25 +1P:သိ N_FEM_KIN: pronoun မှတ်တမ်း
26 +1P:သိ N_FEM_KIN:
27
28

```

Figure 4: The mmnouns.lexc file for Myanmar nouns

```

D:\PhD Research\Kaung Myat Thu\Tutorial+Tool+TEX...
KIN...1, N_ANI...10000...16243, N_INANI...1, N_IRR...
1, Nounfemkin...2, Nounmaskin...2, Nouninani...2, Noun...
2, Nounirr...2, GENDER...4, NUM...16, BEN...2,
CAUSITIVE...2, POLITE...2, EMPHATIC...2, REALIS...1,
GENETIVE...5, MATTER...2, NOMINATIVE...1, ACCUSATIVE
...1, LOCATIVE...1, ABLATIVE...1
Building lexicon...
Warning: lexicon 'MATTER' defined but not used
Determinizing...
Minimizing...
Done!
1.4 MB. 45705 states, 93964 arcs, 5273490 paths.
foma[2]: print pairs > vix.txt
Writing to vix.txt.
foma[2]: read lexc vix.lexc
Root...23, VPREFIX...1, PREFIXVERB...7821, Verbpre...
2, VSUFFIX...7821, Verbsuf...2, N_FEM_KIN...1, N_MAS...
KIN...1, N_ANI...1, N_INANI...10000...16244, N_IRR...
1, Nounfemkin...2, Nounmaskin...2, Nouninani...2, Noun...
2, Nounirr...2, GENDER...4, NUM...16, BEN...2,
CAUSITIVE...2, POLITE...2, EMPHATIC...2, REALIS...1,
GENETIVE...5, MATTER...2, NOMINATIVE...1, ACCUSATIVE
...1, LOCATIVE...1, ABLATIVE...1
Building lexicon...
Warning: lexicon 'MATTER' defined but not used
Warning: lexicon 'Nounani' defined but not used
Warning: lexicon 'Nounani' used but never defined
Determinizing...
Minimizing...
Done!
1.4 MB. 45701 states, 93956 arcs, 4168906 paths.
foma[3]: print pairs > vix.txt
Writing to vix.txt.
foma[3]: read lexc vix.lexc

```

Figure 5: Building morphological analyzer and generator

```

output_mmnouns.txt
4207497 လေးထပ်+V+NZR+SG+ACCU လေးထပ်ခြင်း
4207498 လေးထပ်+V+NZR+SG+NOM လေးထပ်ခြင်း
4207499 လေးထပ်+V+NZR+SG+POL လေးထပ်ခြင်း
4207500 လေးထပ်+V+NZR+SG+POL+EMPH လေးထပ်ခြင်း
4207501 လေးထပ်+V+NZR+SG+POL+EMPHREAL လေးထပ်ခြင်း
4207502 လေးထပ်+V+NZR+SG+GEN လေးထပ်ခြင်း
4207503 လေးထပ်+V+NZR+SG+GEN+MAT လေးထပ်ခြင်း
4207504 လေးထပ်+V+NZR+SG+GEN+MAT+POL လေးထပ်ခြင်း
4207505 လေးထပ်+V+NZR+SG+GEN+MAT+POL+EMPH လေးထပ်ခြင်း
4207506 လေးထပ်+V+NZR+SG+GEN+MAT+POL+EMPHREAL လေးထပ်ခြင်း
4207507 လေးထပ်+V+NZR+SG+GEN လေးထပ်ခြင်း
4207508 လေးထပ်+V+NZR+SG+BENF လေးထပ်ခြင်း
4207509 လေးထပ်+V+NZR+SG+BENF+CAUS လေးထပ်ခြင်း
4207510 လေးထပ်+V+NZR+SG+BENF+CAUS+POL လေးထပ်ခြင်း
4207511 လေးထပ်+V+NZR+SG+BENF+CAUS+POL+EMPH လေးထပ်ခြင်း
4207512 လေးထပ်+V+NZR+SG+BENF+CAUS+POL+EMPHREAL လေးထပ်ခြင်း
4207513 လေးထပ်+V+NZR+PL လေးထပ်ခြင်း
4207514 လေးထပ်+V+NZR+PL+ABL လေးထပ်ခြင်း
4207515 လေးထပ်+V+NZR+PL+LOC လေးထပ်ခြင်း
4207516 လေးထပ်+V+NZR+PL+ACCU လေးထပ်ခြင်း
4207517 လေးထပ်+V+NZR+PL+NOM လေးထပ်ခြင်း
4207518 လေးထပ်+V+NZR+PL+POL လေးထပ်ခြင်း
4207519 လေးထပ်+V+NZR+PL+POL+EMPH လေးထပ်ခြင်း
4207520 လေးထပ်+V+NZR+PL+POL+EMPHREAL လေးထပ်ခြင်း
4207521 လေးထပ်+V+NZR+PL+GEN လေးထပ်ခြင်း
4207522 လေးထပ်+V+NZR+PL+GEN+MAT လေးထပ်ခြင်း
4207523 လေးထပ်+V+NZR+PL+GEN+MAT+POL လေးထပ်ခြင်း
4207524 လေးထပ်+V+NZR+PL+GEN+MAT+POL+EMPH လေးထပ်ခြင်း
4207525 လေးထပ်+V+NZR+PL+GEN+MAT+POL+EMPHREAL လေးထပ်ခြင်း
4207526 လေးထပ်+V+NZR+PL+GEN လေးထပ်ခြင်း
4207527 လေးထပ်+V+NZR+PL+BENF လေးထပ်ခြင်း
4207528 လေးထပ်+V+NZR+PL+BENF+CAUS လေးထပ်ခြင်း
4207529 လေးထပ်+V+NZR+PL+BENF+CAUS+POL လေးထပ်ခြင်း
4207530 လေးထပ်+V+NZR+PL+BENF+CAUS+POL+EMPH လေးထပ်ခြင်း
4207531 လေးထပ်+V+NZR+PL+BENF+CAUS+POL+EMPHREAL လေးထပ်ခြင်း
4207532 လေးထပ်+V+NZR+PL လေးထပ်ခြင်း
4207533 လေးထပ်+V+NZR လေးထပ်ခြင်း

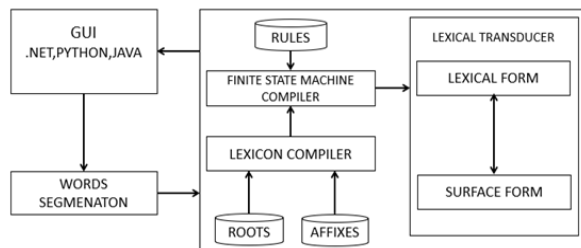
```

Figure 6: Outputs of the system

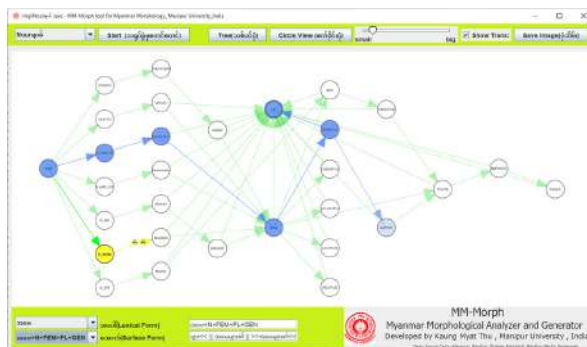
Based on the presented design, the GUI for MM-Morphs: morphological analysis and generation for Myanmar nouns is created by using Python programming language, which has many developed



libraries and packages for integrating the system with other Burmese NLP tasks like romanization, word segmentation, tokenization, speech to text, and text to speech. The MM-Morph tool is now able to analyze and generate Myanmar Nouns. To create a complete morphological analyzer and generator, the other parts of speech will be incorporated into MM-morph.



**Figure 7: The GUI Design for MM-Morphs**



**Figure 8: GUI of MM-Morph tool for morphological analyzer and generator of Myanmar nouns.**

In figure (8), the blue paths show one of the finite state network transactions for forming a lexical form of the word (အမေ/mother).

## VI. EVALUATION

The system works in two tapes, between the lexical and surface levels. The designed system is successfully tested with 2000 nouns randomly collected from some dictionaries and news websites. By applying our system to the nouns list, the system could recognize 1648 words out of 2000, achieving 82.24 % of success. It takes less than a second to analyze a set of nouns. In some cases, rules are set to the wrong words. To overcome these problems, some new rules are needed to add and some must be redefined. Adding more lexical entries collected from different domains to the system could further improve the coverage.

## VII. CONCLUSION AND FUTURE WORK

A language with less computational support can create a massive barrier in the digital age, and the Myanmar language is no exception. There is still no publicly accessible morphological analyzer or generator for the Myanmar language. As for the Myanmar Language, there aren't many study reports or developments for Morphological analysis and generation. Therefore, we have designed MM-Morph tools to encourage researches on the Myanmar language. This tool was created as part of the research named "Morphological Analysis and Generation for Myanmar Language with Finite State Techniques".

We described the development of the first known morphological analyzer and generator for Myanmar nouns based on its linguistic features. Morphological analyzer and generator are mostly related to language's linguistic phenomena. This research is challenging because there are few linguistic materials available for the Myanmar language. We have devoted a lot of work to studying the linguistic peculiarities of the Myanmar language. Verbs, Adverbs, and Adjectives will also be added to the MM-Morph tool as part of this paper's ongoing work in order to provide a fully functional morphological analyzer and generator that can handle in-depth linguistic phenomena.

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# Customer Attitude towards Bitcoin Adoption in the Banking System in Mauritius

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## Abstract

Bitcoin is a decentralized electronic currency that may be used everywhere in the world. Peer-to-peer transactions fuel the network, and encryption is employed to confirm the validity of these transactions worldwide. Block chain technology may be used to maintain a public distributed ledger. Generally, the public is entitled to obtain newly created Bitcoins as a reward by participating in a process known as “mining.” Investors may also think of it as a feasible investment due to the possible future earnings this cryptocurrency may provide. The goal of this study is to determine the extent to which Bitcoin can be integrated into Mauritius’ financial system given that it is at its infancy stage in the financial system of the Mauritian market and is therefore relatively new. Furthermore, comparatively with other markets in the region, and despite being a desirable platform for mining and investing, Bitcoin poses a challenge to traditional financial institutions and policy makers. This study employs a qualitative research design to assess the opinions and viewpoints of executives in the banking industry to gauge their views on the state of the digital currency acceptance in the local market. The study included respondents who were familiar with both Bitcoin and traditional transaction techniques. The study’s findings indicated that Bitcoin has the potential to replace the current monetary system in the future, but only if there is enough awareness, a user-friendly interface, real-world benefits, and efficient risk management.

## Keywords

Bitcoin, Cryptocurrency, Banking Sector, Customer Knowledge, Customer Use, Customer Benefits, Perceived Risks

## 1. INTRODUCTION

This research is focused with the newly emerging topic of Blockchain technology, which was created by

Satoshi Nakamoto to act as the accounting system for the cryptocurrency Bitcoin and has since gained widespread acceptance (2008). Because of the extensive interest in the underlying technology since its inception, a slew of research and articles have been published, as well as increased media attention, which has resulted in considerable enthusiasm among technology enthusiasts. Specifically, according to the Association of Computing Machinery, it is expected that blockchain disrupt any industries on a worldwide scale, as well as redefine financial transformation on a global scale, allowing for secure and rapid, trustworthy, and transparent solutions, due to irreversible nature, transparency, and redefined trust to be created (Underwood, 2016).

As a cryptocurrency, Bitcoin was initially designed with the anonymity of users and the delocalization of transactional activity as its guiding principles (Barber et al., 2012). Following its initial adoption by a small number of inspired followers, bitcoin became widely accepted by the general public, who utilized it for legally structured transactions like as investments and purchase agreements. In tandem with technological advancement has come a rise in the popularity of private digital currencies, which are digital in the sense that they have no physical presence anywhere in the world. Unlike public digital currencies, which have a tangible presence somewhere in the world, private digital currencies do not have such a representation. What is being described here are virtual currencies that have characteristics similar to those of money. In addition to its many other uses, cryptocurrencies serve as a measuring system, a means of trade, and a gauge of worth, among other things. As far as digital currencies are concerned, the ultimate objective is for them to function independently of intermediaries and without the intervention of a centralized issuing body. Digital currencies, in contrast to traditional currencies, which are issued by a central bank and kept by an institution such as a commercial bank or transmitted

through the credit card sector, are established directly by the government and are not held by any institution. Because no third-party intermediary is used, user involvement is handled directly and anonymously between the two parties engaged in the transaction (Nakamoto, 2009). Furthermore, digital currencies have the potential to be used to assist developing economies in overcoming their challenges, according to Grinberg (2011), as a result of these circumstances. According to Grinberg (2011) digital currencies represent a significant and radical transformation in the notions of finance and market liberalization, respectively. As a consequence of technical improvement, developing nations have been able to bypass the costly and time-consuming installation of cable telephone infrastructure and instead rely on mobile cellphones to communicate with their citizens. Users of the internet are utilizing peer-to-peer digital currencies, which are not controlled by the government, in a manner similar to how traditional financial institutions are being circumvented by users of the internet.

In Mauritius, the Bank of Mauritius has been careful in its strategy to cryptocurrencies thus far. As such, a notice alerting members of the public to proceed with caution and diligence when attempting to deal with cryptocurrencies, and further describing that members of the public should be prepared to cope with unregulated virtual currencies risks, which do not provide the same layer of safety as 'hard' or 'real' money.

This research seeks to offer insight on the road and challenges to Bitcoin and blockchain technology adoption, covering two primary groups of participants: developers and users. It examines the features of perceived ease of use, perceived utility, and perceived risk for each kind of stakeholder and feature of technology by means of the TAM as the analysis framework. It also seeks to investigate the difficulties that may arise in the introduction of Bitcoins in the Mauritius financial system. This study also seeks to address what is the present level of Bitcoin comprehension among potential end users; How does the quantity of information influence one's opinion on Bitcoins? And lastly, what are the key factors that influence a person's likelihood of adopting Bitcoins?.

## II. LITERATURE REVIEW

An examination of the literature serves as the foundation for the discussion of Bitcoins. Blockchain technology, which was first introduced in 2009, as a mean for establishing a secure, peer-to-peer network for the transmission of digital currency. Bitcoin, the

world's first and most widely used cryptocurrency, is helping to reduce the use of long-established and unchangeable financial payment systems that have been in place for decades. Traditional fiat money is not expected to be replaced by cryptocurrencies, but the Internet-connected global financial markets may be able to alter the way cryptocurrencies interact with one another by reducing barriers such as those linked with traditional currencies and exchange rates. Bitcoin and other cryptocurrencies have the ability to completely change digital trading platforms by eliminating transaction costs.

According to Baratt (2012), contrary to popular belief, Bitcoin has been linked to criminal web trade sites. However, fundamental nature of such technology is intended for creating instead of undermining confidence. According to Kaplanov (2012) despite the fact that the participants in the transaction are unknown to one another, the present operation, like with all cryptocurrencies transactions, is visible to adherents of such platform since it is recorded on the Bitcoin blockchain. Nakamoto (2008) mentioned that this method ensures the validity and provenance of the bitcoins in circulation.

The public blockchain will allow users track out where the bitcoins came from and how they were transferred if one is a computer scientist who is competent of doing so, and this will be open to everyone. For Brito & Castillo (2013), Bitcoin, contrary to common assumption, is not a viable option for the transfer of unlawfully obtained funds, at least not at this time. When it comes to money laundering, private bank networks are preferred over public bank networks (Bruto, 2015; Singh, 2015).

### Cryptocurrency in Mauritius

As of late, Mauritius has been a "regional sanctuary" for cryptocurrency revolution, as it is seen as one of the technologies offering promising new opportunities throughout Africa and the globe. A public distributed ledger called blockchain is crucial to this study since it is widely recognised as bitcoin's main technical accomplishment. To further its goal of establishing Mauritius as a start-up center point for this technology, the policy makers have supported many subsidies with the intention of expanding their operations across Africa, Asia, and beyond. It follows the BOI's recent introduction of the Regulatory Sandbox License ("RSL"). The government and private institutions of Mauritius have taken different approaches to the rise of cryptocurrencies like bitcoin. The Bank of Mauritius (BOM) has met some of the central banks overseas in warning the population about the dangers of utilising



cryptocurrency like bitcoin.

According to the BOM's notification, users of virtual currencies as a payment or investment method are not protected by any regulations. Nevertheless, some banks have chosen a very different tack when it comes to cryptocurrency and the blockchain. The SALT (Secured Automated Lending Technology) lending platform accepts Bitcoin and Ethereum as collateral, as some financial institution publicized their goal to work with the Fintech company.

This move is in line with the country's vision of becoming a "breeding ground" for blockchain businesses by creating a "Ethereum Island," which would serve as a testing ground for new blockchain technologies and a gateway to emerging markets in Africa and Asia. The island nation of Mauritius hopes to become a "major player" in the blockchain industry. The topic of this research paper is crucial because it will allow for the creation of an appropriate regulatory framework for blockchain technology, cryptocurrencies, and bitcoins in Mauritius.

At present policies are currently being set on cryptocurrencies like bitcoin to regulate it by law. The FSC and the BOI, among other financial regulators, need to draught industry-specific fintech laws. The adoption of such regulations is to solve issues like asset opacity, taxation, and anti-money laundering, while also bolstering the security of the blockchain and cryptocurrency communities at large.

The International Coordination Agency for Crime Prevention is worried that the use of bitcoin and other cryptocurrencies could lead to an increase in criminal activity and drug trafficking in Mauritius. For instance, the Mauritius Securities Act of 2005 does not consider cryptocurrencies to be "securities," hence it does not apply to them ("MSA- 2005"). Investors may be put off by the lack of regulation in Mauritius regarding this emerging form of fundraising due to the rising popularity of virtual currencies. Foreign investors who are interested in the country's potential in the area of blockchain technology are hampered by the absence of an appropriate regulatory framework.

However, blockchain technology start-up businesses who are aiming to expand into the African and Asian markets are drawn to Mauritius because of its commitment to improving its regulatory system. As a result, the Government of Mauritius has announced the establishment of a new regulatory board, the Regulatory Committee on Fintech and Innovation-driven Financial Services ("the Committee"), with the mission of "paving the way for appropriate regulatory frameworks for encouraging and supporting Fintech

development in Mauritius."

### Technology Acceptance Model (TAM)

For the purpose of fulfilling this research, this study adopts a qualitative method inspired by Davis' (1989) Technology Acceptance Model (TAM). Despite the growing excitement for technology, particularly in a challenging economic situation, how well-prepared people are for the challenges of the next generation remain unclear. If a technical breakthrough is to be completely realized, it is critical that society is fully incorporated with that achievement, especially if it is of social importance. Davis (1989) made the TAM as a way to figure out how well a proposed computer or information system would work for a certain group of people. The Theory of Reasoned Action, which tried to explain why people buy things, was first put forward by Fishbein and Ajzen (1975). Scholars have paid a lot of attention to TAM as a powerful tool for analysing the social aspects of technology adoption.

### Perceived Usefulness (PU)

Conventional wisdom says that a person's subjective opinion of a technology's ability to improve job performance affects the user's final decision to use the technology through a middleman called "perceived utility" (PU). People are more likely to use a programme if they think it will help them get their jobs done faster and easier. The most important of these is how useful something is thought to be (Davis, 1989). According to the concept of perceived usefulness, a system is helpful if the user sees a positive link between how it works and how it makes them feel (Davis, 1989). One possible definition of perceived usefulness (PU) is "the degree to which a person thinks that using a certain technology will help him or her do a better job." Because there weren't many applications for end users.

### Perceived Ease of Use (PEU)

The perceived ease of use (PEU) is someone's impression of how intuitive a technology is, which in turn affects how likely that person is to use that technology." Even if people could see how useful a piece of software is, they might decide that it's not worth the time it would take to learn how to use it. That is, people think that, in addition to usefulness, perceived ease of use has an effect (Davis, 1989). If a user thinks that an app is easier to use than its competitors, they are more likely to use it. "Easy" is defined in the dictionary as "free from difficulty or major effort" (Davis, 1989). Last but not least, PEU can be thought of as "how much a person

thinks it would be easy to use a certain system.” (Davis, 1989). Using PEU, it is possible to get a very accurate picture of how users accept and use new technologies.

#### *Perceived Risk (PR)*

The deployment of Blockchain-based applications (BBA) have certain parallels, since they involve the transfer of value across an unprotected, digital, and global network. As risk is an inherent part of electronic commerce, it must be included in any Blockchain study. Many, but not all, subsequent studies of risk perception have relied on Bauer’s (1960) identification of uncertainty and consequences as key structural elements of risk. He stressed that he cared only about perceived risk and not actual danger. Therefore, public relations may be described as follows: “Perceived risk in consumer behavior involves risk in the sense that any action of a consumer will produce consequences which he cannot anticipate with anything approximating certainty, and some of which at least are likely to be unpleasant.” (Bauer, 1960). For Bensaou & Venkatraman (1996), there are two types of inherent uncertainty: behavioural and environmental uncertainty. Risk is either technologically-driven or relational according to Ring & Van De Ven (1994). The distributed and anonymous structure of Blockchain’s value transactions may raise red flags among e users, despite the technology’s promise of a safe and transparent network. Pavlou (2003) identified instances of product deception, fake identity demonstrations, data breaches, deceptive advertising, and warranty rejections are all instances of behavioural risks from the perspective of the final consumer.

#### *Level of Knowledge (LK)*

According to Hackeett (2017) there is “no more hyped and less understood concept” and Valenzuela (2015) further said that knowledge or education is one of the most important aspects of adopting new technologies. The TAM uses self-reported variables like PU, PEU, and PR. Pavlou (2003) suggested adding “Trust” as a mediator. “Level of Knowledge” seems more important than trust in a blockchain setting and was as such used. Those who are knowledgeable with Blockchain are euphoric about the technology, while those who aren’t are sceptical.

#### *Resilience and the intention to adopt Bitcoin (BTC)*

Researchers have studied resilience for two decades. Macdonald et al. (2018), Scholten et al. (2019), Stevenson & Busby (2015) came forward to say that businesses can

benefit from help anticipating, preparing for, responding to, and recovering from disruptions of all kinds. Wamba et al. (2020) and also Sternberg et al. (2020) claimed that Blockchain Technology (BCT) shortens data-driven choices to heighten and restructure operational procedures and resources, as well as information sharing and collaboration between many stakeholders to prevent operational failures and increase service reliability. By keeping an eye on potential dangers and formulating a strategy, businesses can change quickly and effectively to Volatility, Uncertainty, Complexity and Ambiguity conditions according to Millar et al. (2018). For Rubbio et al., (2019) the influence of resilience on desire to use BCT has never been demonstrated and experimentally explored, despite resilience’s importance in all circumstances.

### **III. METHODOLOGY**

Primary data were collected to come with concrete and significant information to address the research questions. Due to its features and exploratory nature, qualitative research was selected as the optimal methodology for this investigation. When studying a new or poorly understood phenomena, Eriksson and Kovalainen (2008, pp. 5-6) argue that qualitative research approaches are particularly useful. The authors also note that the goal of this study is best served by using qualitative research methods because of their emphasis on obtaining in-depth knowledge of a phenomena and its underlying causal links. This study analyse the spread of blockchain technology in the banking industry using semi-structured interviews. It was decided that semi-structured interviews, which are frequently used in qualitative research, were the best technique of research and data collecting for this study. Kotler and Keller (2006) said the research design’s goal is to ensure the data can be utilised to solve the problem statement. “Research design” refers to rules for performing studies using various approaches. TAM was used to assess BBA adoption in Mauritius’ banking system (Technology Acceptance Model). Despite TAM provided mainly quantitative outputs, it is not uncommon that it is used to attain informative data. By applying qualitative methods with the TAM, underlying motives, perceptions and definitions that each participant has can be explored fully. The target population were bank employees in Mauritius who serve as the primary point of contact for the study. Primary sources were used for data collection. When a researcher obtains primary data, it comes through first-hand interactions with the people or communities being studied according to Saunders, et al. (2012).

This means that the researcher goes straight to the information source and gets data for a given research endeavour. Interviews, direct observation, and surveys are examples of primary data collection methods. Simply said, secondary data are those that have been obtained previously but not by the user (Saunders, et al, 2012). Qualitative research data was utilised to analyse the outcome of the conducted investigation. This strategy is deemed acceptable, as it will allow us to learn all there is to about the topic under investigation.

#### Interview

Data gathering is as vital as research. Yin (2009) defined six information sources: interviews, direct observation, participant observation, physical objects, and recordings. Interviews were chosen because they reveal respondents' perspectives, ideas, and beliefs better than surveys. According to Bryman & Bell (2001), interviews are employed to collect qualitative data because they allow for in-depth participant descriptions. This method rapidly and successfully gathers information. Gray (2009) says interviews are difficult due of the high amount of involvement between interviewer and responder. Due to poorly written questions or unhelpful prompts, researchers might misinterpret informant responses or acquire erroneous data.

Organized, semi-structured, or unstructured interviews are available. Semi- structured interviews at the intermediate level may overcome these problems. This kind of interviewing uses a list of subjects and questions, but the details vary. Five interviews yielded five data sets during week of July over the phone. According to Langdridge (2007) said the interview guide is important. Interview guides should elicit as much relevant information as possible to address the research question. The interview guide was organised to include straightforward, relevant answers. A data analysis interview schedule was implemented in the study. The objective was to use current theories to determine the best qualitative analytic approach for this topic. Interview transcription was the analytic process since it permitted familiarisation with the information.

Ethical research aims to preserve the welfare of study participants by ensuring they are not exposed to risks or bad consequences from research techniques. Ethics considerations were considered while acquiring the data from the interviewees. Obtaining the participants' informed consent means they were provided enough information about the research's goals and the interview's purpose. Respondents' anonymity and

identities were not compromised since they were not asked for their names in the interview transcripts.

#### IV. FINDINGS

The general profile of the five respondents was basically the same; they are all evolving in the banking sector at higher level of management where some also provide investment activities. Interview 1, has more than 20 years of experience in the banking sector and has an managerial role. He has been involved in business processes and strategic services. He studied finance and over 20 years in investment management. Interviewee 2, has 15 years' experience as project lead after more than 10 years in IT programming in banking sector. He has a master in engineering. Interviewee 3, is an experience IT engineer who has several professional qualifications from international institution. Interviewee 4, has 19 years of experience, compromising 3 years in fraud monitoring, 10 years in custodian activities and having a degree in business management with financial risk as specialization. Interview 5, is an IT specialist who studied IT in India, has a Master degree in software engineering and coding.

Following the invitation to interview, the respondents were who all interviewed using the same questions related to set themes which focused on analysing the initial variables, PU, PEU, PR, IU and LK:

They have further been questioned as to what were their definition, perception and what they thought could be the attributed of bitcoin and how knowledge could impact its successfully integration in Mauritius. This part provided unbiased, filter-free responses. Going about the level of knowledge part, they all agreed to some extent that Bitcoin adoption requires a deep documentation and preparation in order to go forward a successful implementation.

"I personally learned about it through a friend. But if I did not make the effort to learn more, to be curious I would not have been able to answer you today. Identically, if the BoM successfully launched the digital currency, which will be mostly present in custodian service, and having investors not willing to deal with digital currency at all, what would have been the use of all this? It can definitely be a very good way to trade but if you are anchored in your traditions, not willing to learn, adapt and follow then, there is no way you can survive technological innovations." Interviewee 5

"I personally believe that if none of us if take the risk to share what we really know on the subject, we will never know where we stand, what needs to learn or what needs to be worked upon for us, as bankers to be fully equipped to adopt this technology." Interviewee 2

### Perceived Usefulness

Respondents to the interview agreed that the banking sector stands to gain significantly from using blockchain technology. Some of the identified benefits have been demonstrated to be possible, while others are only theoretical and in the early stages of development. It has been determined that the key drivers driving the adoption of blockchain technology are the capacity to store and distribute trustable and verifiable data in a computational form between entities, and the digitization of completing transactions and contracts. These were also considered crucial in deciding the success of blockchains.

Increasing productivity through automation, swift transactions, and low overhead costs was cited as a major advantage. Financial processes are often sophisticated transactions based on the formation of agreements and the execution of contracts between transacting parties. Furthermore, they frequently necessitate the engagement of multiple businesses and intermediaries. This complicates and hinders the entire execution of various procedures, as well as raising transactional expenses. All of the interviewees, however, agreed that blockchain technology may improve the efficiency of completing transactions and contracts and relocating assets.

"Using blockchain technology helps us when we manage a hub in a network that only stores information about our clients. Then, we may safely and effectively share the information throughout the network to carry out the agreements and transactions that have been made." **Interviewee 1**

"Harmonically labelled information with blockchains boosts efficiency and simplifies various operations. Blockchains have the potential to improve efficiency through reliability and openness." **Interviewee 2**

"All sorts of intricate tasks can be performed in a less complicated fashion. Increased effectiveness in value transfer processes is the potential of cryptographic technology and trust chains." **Interviewee 3**

"Blockchain technology is a mean toward cost reduction. You see, it eliminates intermediaries which are required in the traditional processes as we know it in Mauritius. Transfers are executed with less efforts and more rapidly." **Interviewee 4**

"There is an ease in innovation. When we look at other countries, Mauritius is still lagging behind on many points. The usefulness in integrating such technology are that execution of transfers are of high speed, there is disintermediation and more control over one's own money." **Interviewee 5**

### Perceived Ease of Use

Interviewees have been questioned on how far they can define BTC and BCT as easy to ease. Interviewees 2,3 and 5 all agreed that Bitcoin requires less permission. The original software was an opened-sourced one; they stated it is an easy-to-use interface.

"It is very easy to use at least from my point of view. It takes another sense when it comes to developing BBAs." **Interviewee 3**

"Available documentations on Bitcoin mechanism makes it a basic thing to understand and use. For banks, we need lot of permissions, a load of programing to synchronise several interrelated applications. Bitcoin however, has no such barriers." **Interviewee 5**

Interviewees 1 and 4 however raised another important aspect to the question of the ease of use; the adaptation within the banks when time for change will come.

"Indeed, we are talking about innovating and going a step ahead in the Mauritian Banking landscape. But do you think it will be that easy firstly for employees who have been working for years in a way and to suddenly stop and change? It will be the same for many customers as well. The learning stage might be long and costly for banks." **Interviewee 1**

"It can be implemented here in Mauritius and in banks but not at every level. Some departments must still continue in the traditional way. Look at the trading activities, it will never be as easy as it can be with such technology. The difficulty can reside in the way how newly transformed departments such a custody or the Payments department, will easily switch from the old way of doing to the new one." **Interviewee 4**

### Perceived Risk

When talking about perceived risk, interviewees pointed out the increased security. A great deal of trust is necessary for the provision of financial services and products, and substantial amounts of reliable data are routinely exchanged between parties in order to forge bonds of understanding and carry out dealings. As a result, safe and trustworthy distributed networks such as blockchains are extremely valuable to the banking sector. They make it possible to conduct digitally signed transactions and contracts that can be validated by all nodes in the network.

Moreover, the implementation of such transactions and contracts may be monitored closely because of tracking and accessibility. The end result is a more secure and risk-free design.

"By using digital and cryptographic signatures, we have a legally binding contract that we can monitor in



real time, allowing us to evaluate the risks involved and take appropriate action.” **Interviewee 1**

One of the benefits of blockchain technology, according to Interviewee 1, is that it is resilient since there is no central point of failure. Intermediary financial institutions and organisations routinely play a key role in the execution of transactions and contracts that span many systems. In the case that the network supporting the execution of transactions and contracts is centralised, there is a high probability of failure. However, because a decentralised network has several nodes, the danger of failure is reduced. As a result, resilience is an advantage that leads to robustness and enhanced availability of financial services.

“In contrast to having a failing centralised service, we can now continue to do business even if one or two nodes fail. This is an advantage made feasible by decentralisation.” **Interviewee 1**

Interviewee 1 further said that blockchain technology has increased knowledge of the potential ways in which various financial sector activities might be carried out and introduced new ways of doing business. They also said that this change in outlook is helpful to the development of the financial industry since it facilitates the delivery of novel solutions to persistent problems. As a result, the financial industry as a whole works together to identify methods to make systems more reliable and secure.

“This new style of working together promotes open-mindedness [...]” This shift will aid us in moving forward.” **Interviewee 1**

#### *Intention of Use*

The interviewees have been questioned on their intention to use BTC/BCT. Since it is not yet implemented for the moment and none of them is directly dealing with it, their answers have shed the light on what according to them could influence the adoption of bitcoin in banks. It is noticed that the intention of use is linked to the infrastructure support, security and regulatory frameworks mostly.

“IT infrastructure, including hardware, software, and network systems, is especially important for Bitcoin’s success since it allows different Bitcoin systems to communicate and function together. Public or/ vs. private concerns might arise with regards to technological matters including interoperability, data security, design, and permissions. Strengthening Bitcoin’s underlying technology requires a focus on privacy and experience.” **Interviewee 2**

“The widespread adoption of innovative technologies like bitcoin depends in large part on their security.

Hacking and modifying on a peer-to-peer basis places a premium on the research, development, and design of decentralised operating systems. Advanced technical solutions should be employed to secure user systems (financial) to avoid breaches resulting to loss of money and to build stronger consumer trust, all of which would help spread the word about bitcoin and boost its adoption.” **Interviewee 5**

#### *Factors Affecting the Adoption of Bitcoin in Mauritius*

The respondents have further been questioned as to what were their perception on the factors which could affect the implementation of such technology in Mauritius. Their responses provided an array of aspects. Interviewee 1 conceded that the regulatory framework could represent a major point.

Their responses provided an array of aspects. Interviewee 1 conceded that the regulatory framework could represent a major point.

“Yes, we have heard that the government is seeking to go forward to more digitalization, mainly the digital currency. But none of us have heard more about the regulations, how it will work, who will work on in and who will be regulating that is barely known to many of us. It still represents a risk if proper documentation and guidelines are not created and shared to all the stakeholders.” **Interviewee 1**

Another factor identified unanimously was the lack of knowledge itself. All interviewees said that if one is not acquainted or even not willing to learn what it is all about, there is no way this could be a successful innovation.

“When talking in the adoption in banking sector, the less attractive part is that users, once educated on Bitcoin, will be able to handle the transactions themselves. Banks will find themselves losing revenues generated from transactional related services.” **Interviewee 3**

The professionals who were questioned stated that it is difficult to locate skilled developers of decentralised architecture that possess the necessary competence and are up to date with current trends. In addition, even if these competent engineers could be found, it would be difficult and expensive to get them to participate in activities linked to blockchain technology.

This is because of the industry’s complexity and the fierce rivalry within it. This will remain true regardless of where they are on the planet. According to the second and fifth interviews, the configurations and designs of blockchains that are appropriate to the financial industry have only been developed to a very limited level up until this point. This is still true even though blockchain technology has been available for a while.

In addition to this, they made the observation that after the initial presentation, the manufacturing stage of the process is reached by a limited number of networks only. As a direct consequence of this fact, it is very feasible that discovering and constructing decentralised architecture will be a challenging endeavour. It has been shown that there is a barrier in the form of a lack of awareness and information regarding blockchain technology; hence, there is a necessity for increased understanding and knowledge regarding this technology.

## V. DISCUSSION AND CONCLUSION

The participants in this interview were unanimous in their belief that the potential benefits given by blockchain technology outweighed the risks inherent in the process. While some of the benefits that were mentioned have been shown to be beneficial in practise, others are still in the conceptual and experimental stages of development at this point. The capacity to carry out transactions and contracts digitally, as well as the capability to store and move trustworthy and verifiable data across organisations in a computational manner, are some of the drivers that are propelling the use of blockchain technology.

Additionally, the ability to conduct transactions and contracts digitally opens up the possibility of new business models. It was also anticipated that the degree to which these factors would affect the practicability of blockchains would vary greatly. The findings indicate that the potential influence that blockchain technology might have on the financial industry of Mauritius should not be understated. Based on the interviews, it seems that the banking business in Mauritius has a greater influence, both positively and negatively, on the banking industry in other countries.

Due to an insufficient number of pertinent replies, the survey was severely flawed in several respects. Only a small fraction of respondents had information on how the TAM framework has been used to the study of blockchain technology's uptake.

The descriptive analysis revealed that most respondents do not have enough knowledge on BBAs and/or BTC. The respondents of the survey also believe that their implementation are negatively affected by the lack of knowledge and their associated risks mainly. Though there are still sight of huge benefits for the banking industry in Mauritius, there are threats through the uncertainties represented in the regulations and legal aspects of the technology itself. It is time for great changes in the Mauritian banking industry. Despite the speed with which BBAs deliver services, respondents

are more trusting in banks when conducting financial transactions.

BBAs and BTCs have an influence on the Mauritian banking business, both positively and negatively. In terms of the positive effect, the banking sector is improving their services and offering clients with more efficient communication and contact. However, the negative consequences mostly include security breaches in banks. The negative consequences also include a lack of well-equipped followers if the technology is to be adopted quickly.

## Addressing Research Questions

One might conclude that the revised TAM model was a valid tool for gauging people's openness to new forms of technology. The drivers of "Level of Knowledge," "Perceived Ease of Use," "Perceived Usefulness," and "Perceived Risk" have been shown to accurately predict the anticipated use and, therefore, the adoption of Blockchain. The constructions utilised to make predictions about future use were solid, and every research question tested out to be.

The answer to the issue of whether banks are prepared for the impending Blockchain revolution was slightly positive, and this could be highly due to the developmental stage of this technology in the local market, hence not widely accepted yet. Even when looking at a highly educated sample group, there remains a significant knowledge gap. As it turns out, financial institutions do not seem to be ready. This is consistent with the literature, which often draws parallels between the present level of Blockchain development and adoption and the early days of the Internet. Banks may be at a disadvantage in terms of real adoption of Blockchain-based applications due to a lack of understanding. Regulators and corporations may use this lack of understanding to their advantage, limiting and privatising Blockchains at the expense of citizens' economic and social well-being.

The research is useful for gaining insight into the kind of individuals who will be impacted by the Blockchain technology breakthrough and how to approach them. Based on a consumer-centric framework, the research pinpointed four key features that should form the backbone of any Blockchain deployment. If customers were to use the technology, lowering their anxiety about it is of paramount importance.

The variable labelled "Perceived Risk" had the greatest effect in foretelling adoption. A reduction in perceived danger and an increase in acceptability might result from education on security features and a growth of trust in the technology and supplier. Educative

advertising might be used as a strategy to reinforce such effects by increasing broad levels of knowledge. Banks may boost Blockchain's perceived utility and simplicity of use among prospective consumers by creating applicable real-world applications, which will aid society in understanding the scale and socio-economic potential of Blockchain and establishing acceptability.

Blockchain is predicted to be one of the next major technical revolutions, alongside the Internet, personal computers, and smart phones, according to literature. In order to ensure the long-term viability of their business, bankers and related authorities should keep abreast of the latest technical developments.

A significant gap was observed in terms of banks perspective and degree of understanding among bankers. Through the TAM, we were able to provide a better picture of banks' present level of understanding, perception, and anticipated usage of Blockchain while also filling in part of the gap. Despite Blockchain's infancy and the participants' mixed levels of familiarity with the technology, this model has been shown to be valid and trustworthy.

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# The Impact Work–Life Balance on Employee Performance in Educational Institutions in Mauritius

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## Abstract

Educational institutions are a place where people register themselves to enhance their skill and intellectual ability, as their role is to develop manpower in the society by providing people knowledge for them to develop their capabilities. Work-life balance (WLB) is an essential component as it is among the key factor for employees to avoid struggling in finding valuable time for the family without neglecting their work-related activities. In the past organization did not value WLB as a key component which can improve performance, but nowadays WLB is an essential factor with can improve productivity level in the organization. In this study, investigate how WLB has an effect on Employee Performance (EP) in the educational institution in the context of Mauritius. There were many studies in the past on the impact of Work-life balance on Employee Performance, but there was a limited study on the impact of Work-life balance on Employee Performance in educational institutions in Mauritius. Thus, this study, explore how employees in educational institutions WLB are affected. This could be due to changes in demographic and work environments, such as a change in family structure and change in working conditions that have caused stress and fatigue to employees. For the purpose of this study a survey was conducted among 193 employees from different types of institutions in Mauritius. A regression analysis was conducted to examine the hypotheses. Accordingly, the result indicated that Work-life balance has a positive significant effect on employee performance. Furthermore, Work-life balance has a positive effect on employees' job satisfaction, employee engagement, and affective organizational commitment and that employee engagement of the model happiness at work has a positive impact on employee performance. The recommendations and implications for the study are discussed.

## Keywords

Work-Life Balance, Job Satisfaction, Employee engagement and Affective Organizational Commitment, Employee Performance

## 1. INTRODUCTION

Educational institutions are a place where people register themselves to enhance their skill and intellectual ability (Jain, 2013), as their role is to develop manpower in the society by providing people knowledge for them to develop their capabilities. Those educational institutions consist of different manpower such as; educators, administrative staff, managers, directors, and other supportive staff which will help to make the process of knowledge sharing proceed smoothly, without their effort it is impossible to enable the process of knowledge sharing. According to Mwadiani (2002), employees in educational institutions have crucial roles and their skills and abilities can make a difference for the institutions to function properly. We can relate those concepts of Mendis et al., (2017), where he states that employee performance (EP) is related to the employee skill and ability to perform their job in an applicable manner which leads to achieving organizational goals and objectives.

Therefore, we could assume that educational institutions are mostly dependent on human intellectual capital and unarguably Human Resource Management (HRM) of educational institutions is considering the bridge between the employee and the institution. HRM is an essential element that could affect employee commitment and manage employees in the institution. Their decision has an impact on the happiness of employees or productivity and commitment of employees towards the organization, which is mostly dependent on programs they implement for employees (Mendis et al., 2017). The programs HRM develop to facilitate work-life balance has an impact on both employees and education



institutions, as it affects the recruitment and selection process or training and development of employees (Jain, 2013), likewise WLB has an effect on well-being, stress level, and happiness at work (Helmle et al., 2014) of employees.

If those institutions execute an effective WLB program, this could satisfy employees expectation (Noah and Steve, 2012), resulting in employee job satisfaction (JS) and employee engagement (EE), as they will be happier while doing their tasks and will be more enthusiastic about their job, as WLB is something that is often pointed out in the educational institutions, however, it is one objective which is difficult to achieve (Educational support, 2020), for many educational employees, but can be boosted up if the institution implements an effective WLB program. Moreover, (Hill et al, 2003) states that a healthy WLB helps in resolving work and family conflicts as it creates flexibility for employees to balance their work and family life which results in a positive spillover, which has an impact on the employee performance (EP).

There were many studies in the past on the impact of WLB on EP, but there was a limited study on the impact of WLB on EP in educational institutions in Mauritius. Thus, through this study, we will observe how employees in educational institutions WLB are affected. Some of the common reasons could be due to changes in demographic and work environments, such as a change in family structure and change in working conditions that have caused stress and fatigue to employees. Thus, creating Job to Home spill over or Home to Job spill over has a negative impact on EP at work, and also employees will encounter family issues. WLB enables employees to balance their work role and personal life, to avoid neglecting family responsibilities and paid work duties, but the educational institutions have an important role to facilitate WLB for them to boost the employee's performance and prevent employees from having work and home conflicts. The general objectives of this study are to identify the impact WLB has on EP in educational institutions. It examines how WLB has an impact on JS, employee involvement, and organizational commitment of employees in the educational institutions. This study also attempts to investigate how job satisfaction (JS), employee involvement, and organizational commitment have an impact on EP in educational institutions.

## II. LITERATURE REVIEW

WLB is the key factor for employees to avoid struggling in finding valuable time for the family without neglecting their work-related activities (Kumar and

Shiva Kumar, 2011). In the past organization did not value WLB as a key component which can improve performance, but nowadays WLB is an essential factor which can improve productivity level in the organization, as it can be neglected by the organization as it has a link to EP, satisfaction, involvements or even commitment toward the institutions, so in this study, we will observe how WLB has an effect on EP in the educational institution.

This study is associated with the spillover theory set by (Guest, 2002), which proposes the condition under which work and family micro-system operate. Spillover occurs when there is an interference of one sphere of life with another (Obiageli, et al., 2015). There could be a positive spillover or a negative spillover from the work domain to the family domain (Zedeck, 1992; Hill et al, 2003; and Hasen et al, 2006). Furthermore, work-family border theory emphasizes on the two domains which are work and family. The result of this theory seeks for Work-life Balance, as it has the interest to avoid role clash between the two domains (Clark, 2000). Work-family border theory views work life and family life as a different sphere that influences each other (Clark, 2000) and it should have been kept separately to prevent any conflict between the domains. In this study, (Clark, 2000) theory of Work-Family border theory is used to observe how an effective WLB implemented from the educational institution results in a positive outcome in EP.

The evolution of the term work-life balance (WLB) is versatile; as the words have different meanings which can differ with age, interest, value, personal situation, and character of each person (Dean 2007, 5.19 as cited in Stella et al, 2014). According to (Greenhaus and Allen, 2011) Work-life balance is described as an individual's satisfaction with their work and life roles given their priorities. WLB can be related to the human resource aspect, as they have many elements of thought, one of these attributes are work-life conflict (WLC) or problems that employees encounter while trying to balance the inside and outside environments such as employment issues and social or family issues (Stella et al., 2014). Moreover, Na'swall, Hellgren, & Sverke, (2008) suggest that Work-family conflicts are relatable due to the absence of WLB, which is caused by long working hours, leading to job tiredness and link to employees experiencing job-related stress which affects their well-being and works life. (Helmle et al., 2014) states that research based on work-life balance was absorbed from the impact of organization facilities which help in minimizing WLC.

Past studies have demonstrated that to reduce conflict between work and family job demand plays an important role in the process (Emsile, and Hunt, 2009, Hon and Chan, 2013). Employees who perceive little flexibility at work experience more Work-family conflicts compared to those employee's job provides greater flexibility (Helmle et al., 2014). Based on (Helmle et al., 2014) statement when an employee gets access to facilities like a flexible schedule, childcare, parental leave, and support from a supervisor appears to result in a reduction in stress level and absenteeism of employees. An employee's physical and mental well-being is crucial, it acts as a stress buffer (Coleman, 1993; Aloha, 1993; Trainor et al., 2009), which makes employees focus more on their work and be happier in their life, which will lead to an increase in employee JS.

#### *Employee Performance (EP)*

EP can be defined as positive or negative outcomes that arise from a specific job task or activity during a specific period (Bernardin and Russell, 1998). According to (Ferris et al. 1998) EP is based on the same important combination like opportunity, ability, and effort, which are measured in terms of outcome. (Campbell, 1993) states that EP relates to the ability of an individual to fulfill their task performance. Based on the above researcher's definition we can conclude that EP relates to the ability of an employee to execute their job-related activities as expected.

Furthermore, according to (Abualoush et al., 2018a), EP is associated with the organization process link towards productivity and efficiency level. Likewise, (Mathis and Jackson, 2009) state EP is based on the quality and quantity of output, effectiveness, and efficiency of work accomplished and timelessness of output, such as the ability of employees to execute their tasks in appropriate situations and time. This shows how much EP has a major contribution for an organization to succeed. (Yang, 2008) states that if employees display a positive performance in the organization, they can be rewarded in terms of financial incentives. As rewards for employees play a big role in positive EP outcome, which will bring EE and resulting in quality work performance. To conclude, EP depends on several factors like JS and employee commitment, but it can also bring several benefits to an organization such as efficiency and productivity. In this study, EP will act as a dependent variable so I will identify how WLB will have an impact on EP.

#### *Happiness at work*

Being happy is being considered an important factor for employees, said (Diener, 2000) as past studies have shown that when an employee is happy that adds a high-value goal to the organization's performance. (Fisher, 2010) states that happiness can be different from human emotion which can be in terms of joy, enjoyment, pleasure that an employee might display. For an employee to be happy at work, human resource management (HRM) plays an important role that helps to lead to EP. As happy employees deal with less stress, they will be healthier at work and they will feel good in the working environment that is due to the WLB program implemented by the organization which has a positive impact on them (Kouboya and Buchko, 2013).

#### *Job satisfaction (JS)*

Employees JS can be relating to the degree to which an employee has access to equal and appropriate treatment in an institute (Abdallah et al., 2017), based on the concept of (Noah and Steve, 2012) an employee is being satisfied if their expectation is fulfilling, which will make them enjoy their job role; such as if their level of workload matches their income level, this will lead to employee JS. According to (Bataineh, 2019), JS indicates the link on how employees feel about their job, and that different job policies imposed on them by their organization have an impact, such as an effective WLB program which has an impact on their JS.

#### *Employee Engagement (EE)*

Employee Engagement (EE) can be related to employee's devotion toward their roles assigned within the organization (Al-dalahmeh et al. 2018). Another researcher defines EE as the devotion, passion that an employee contributes at the workplace (Amhalhal et. al, 2015), he also relates positive employee emotions linked to employee commitment while they are engaged in their job. Based on previous studies, EE is affected by multiple aspects which are related to both rational and emotional aspects associated with general work experience (Kompaso and Sridevi, 2010). According to Robinson's definition of EE, he relates it as a positive attitude displayed by an employee for their organization, (Robinson et al., 2004), and based on the business context EE helps to link employees with colleagues to perform duties which will help the institutions to be more productive. Based on past studies, (Joo and Lee, 2017) state that EE demonstrates positive organizational outcomes such as high JS, higher productivity level, and lower the intention of

turnover in the institution. In addition, (Grawitch, Gottschalk & Munz 2006) argue that WLB results in EE at the workplace due to JS and organization commitment, which contributes to the level of productivity on their job.

#### **Affective Organizational Commitment (AOC)**

AOC embraces the emotional attachment that an employee experiences while they are being recognized for their contribution towards the organization objectives (López-Cabarcos et al., 2015). Likewise, for (Porter, et al., 1974), AOC can be referred to as the strength of an employee's recognition with his/ her contribution to a specific organization. As per (Ammar et al 2017 and Abdallah et al., 2017) suggestion, AOC can be delineated as the relationship that an employee has toward its organization and its belief in the objective set by the organization and its willingness to work towards the goals of the institution. (Sakthivel, and Jayakrishnan, 2012) state that WLB tends to be an indicator of AOC, as they have a positive outcome on the organizational commitment with employees when WLB policies are in favor of the employees. Some studies have shown that a high level of commitment of employees will result in an inverse relationship towards turnover in the organization (Saba et al., 2014). That means as employees are committed to their organization they will be less willing to leave, rather than encourage outsiders to come and join them in the organization. On the other hand, (Sakthivel, and Jayakrishnan, 2012) have found that employee's WLB and AOC have an impact on the organization and EP, this shows employee commitment in the organization can help the organization progress.

#### **Work-Life Balance, Happiness at work, and Employee Performance:**

##### **WLB and EP**

WLB has been mostly referred to as a positive outcome on employees, as it creates a practical culture of honesty and trust for them to get support for their work and home issues (Maxwell and McDougall, 2004). According (Baral and Bhargava, 2010), support for WLB enhances the physical and mental condition of an employee by making them able to engage in multiple job roles and be flexible which develops a positive affection to work performance. Instead, (Hall and Ritcher, 1988) state that it is important for employees to have a clear boundary between work and family life as if those two domains intercept, this will create employee burnout and result in poor performance

at work from the employee. Based on (Tamunomiebi and Oyibo, 2020), many employees face difficulty to balance their work and life separately, due to many obligations and poor control at work which makes employees lack energy for personal life. This will result in poor performance from employees and a decline in quality of life due to much pressure from both domains leading to fatigue.

WLB has an effect on behavior and well-being of employee which result to the EP at the workplace, that why the HRM of the organization is willing to implement employee flexibility arrangement, with these support from the management, employees can be self-efficacy and willing to perform well in the organization (Mmakwe and Ojiabo, 2018). Hence this study will demonstrate how WLB has a significant relationship to EP in the educational institutions

#### **Happiness at work (JS, EE, and AOC) and EP**

In recent studies, it has illustrated that employees who are happier at work, will encounter a greater level of JS (Bataineh, 2019). Happiness at work is essential to make employees satisfied with their jobs and make them willing to perform at their maximum level in the organization (Fisher, 2010). A happy workplace for employees brings a sense of affection and enjoyment which provides great meaning to their work-life (Bataineh, 2019), and this will create JS. When an employee is motivated with a happy workplace, this will result in more EE in their job activities (Joo and Lee, 2017), which will improve the productivity of the organization. According to few studies, happiness at work tends to make employees be more productive and make them efficient and effective at their work which results in EP and this is due to the work environment (Saenghiran, 2014).

#### **WLB and Happiness at work (JS, EE, and AOC)**

The concept of WLB is based on employee perception over how well they could be able to balance their work and personal life (Greenhaus and Allen, 2011). If an employee has been facilitating with WLB they will be happier at work as they will be out of work-family conflict, which arises because employees have a problem balancing two domains due to high workload and family duties (Kahn et al., 1964). So, it can be said that for an employee to be happy at work, the organization should provide WLB facilities like flexi-time, share time, or work at home, to make employees have an equilibrium in their work life and personal life to avoid employee burnout.

When organization facilitates WLB to employee this will make employee have a sense of JS which make them willing to come to work happily, as they can break down work life and family life effectively that makes them be in better control of their responsibilities, this could lead to satisfaction and result to employee positive performance outcome in the organization (Greenhaus and Allen, 2010). WLB makes employees more engaged in the organization when they are satisfied with WLB facilities, which make them willing to engage in different job-related activities, (Joo and Lee, 2017), which lead to positive employee outcome. This study demonstrate how WLB has a significant effect on happiness at work (JS, EE, and AOC) in an educational institution.

Based on the above literature review

*Hypothesis 1:*

WLB has a statistically significant impact on EP in educational institutions.

*Hypothesis 2:*

(a) WLB has a statistically significant effect on employee's JS in educational institutions.

(b) WLB has a statistically significant effect on employee's AOC in educational institutions.

(c) WLB has a statistically significant effect on EE in educational institutions.

*Hypothesis 3:*

(a) JS has a statistically significant effect on EP in educational institutions.

(b) EE has a statistically significant effect on EP in educational institutions.

(c) AOC has a statistically significant effect on EP in educational institutions.

### III. METHODOLOGY

This study is an explanatory research, as it attempts to identify the actual reason a phenomenon occurs. Quantitative research is carried out for this study and primary research techniques, was adopted to conduct an inquiry to determine the relationship between the variables. The research instruments used for generating data for the literature were all coming from secondary sources which are; online journal articles, research papers, and those sites from which the author gather the information were google scholar and emerald insight. The sampling technique used for the data collection process was a probability sampling technique which is stratified sampling, where respondents will be divided into subgroups based on the type of institutions and then randomly select a respondent from each group for analysis. The data collection process was carried out over a period of three

months with employees in primary, secondary and tertiary educational institutions. The target population for this research were employees in educational institutions, and this survey appeals to employees such as directors, managers, administrative staff, teaching staff, and other support staff in educational institutions. To achieve the objectives of this study 193 respondents participated in the survey.

The instrument used to collect data was a questionnaire which consisted of 29 questions which were set in different sections covering all the variables of this study as well as the demographic profile of the participants. A 5-points Likert scale was used to gauge participants' response. Items for the both independent and dependent variables were adopted from previous studies from: Hayman (2005); Helmle et al., (2014); Saba Iqbal et al., (2014); Al-dalahmeh et al., (2018); Harter et al., (2002); Al-dalahmeh et al., (2018); Saba et al., (2014); Kuvaas, (2006); Koopmans et al., (2013); Kessler et al.,(2016) . For the data analysis process, the SPSS version 20 software was used for data analysis and several analyses were conducted to determine the association between the different variables of this study.

### IV. FINDINGS

#### Brief Demographic Profile

**Table 1: Descriptive statistic for Demographic Profile**

Demographic Questions	Categorical	Frequency	%
What is your biological gender?	Male	62	32.1
	Female	131	67.9
What is your age group?	20-29	28	14.5
	30-39	74	38.3
	40-49	75	38.9
	50-60	14	7.3
	60+	2	1
What is your level of education?	CPE	24	12.4
	SC/HSC	34	17.6
	Diploma	30	15.5
	Bachelor's Degree	55	28.5
	Bachelor's Masters	41	21.2
	PhD	9	4.7
What is your marital status?	Single	45	23.3
	Married	133	68.9
	Divorced	11	5.7
	Widow	4	2.1



Do you have children?	Yes	128	66.3
	NO	65	33.7
In what type of institute are you situated?	Pre-primary	22	11.4
	Primary	49	25.4
	Secondary	87	45.1
	Tertiary	35	18.1

In the survey, respondents were asked about their level of education based on the certificate they have. The majority of the respondents has a Bachelor's Degree which is 28.5% (N=55), followed by 21.2% (N=41) who has a Bachelor's Master's qualification, 17.6% of respondents have completed their SC/HSC with (N=34), follows with a slight lower respondent of (N=30) which is 15.5% which has a Diploma, and follow with the respondent with a CPE certificate of 12.4% with (N=24) and lastly with the (N=9) with 4.7% respondents which has a Ph.D. So, we can say Ph.D. respondents are highly underrepresented compared to respondents with a Bachelor's Degree. In the survey, respondents were asked details upon their marital status, based on categories set which are Single, Married, Divorced, and widow. The vast majority of respondents state they were married which is 68.9% (N=133), followed by 23.3% of respondents who were single (N=45), 5.7% of (N=11) were Divorced and only 2.1% were widow (N=4).

In the survey, respondents were asked if they have children, and the option provided was "YES" or "NO". Based on the response of the respondent, the majority of the participants have children which is 66.3% (N=128) which is dominating versus 33.7% (N= 65) respondents who do not have children. The respondents were asked about their type of institutions based on, Pre-primary, Primary, Secondary and tertiary. The majority of the respondent were from secondary institutions (N=87) with a 45.1%, follows with primary institutions respondents with 25.4% (N=49), 18.1% of the respondents situate in the tertiary Institutions (N=35), and, the lastly, only a small number of respondents (N=22) were in Pre-Primary institutions which are 11.4%. Based on the detail above, employees from Pre-Primary institutions are underrepresented in the study. The survey respondents were asked about their Job role, based on the categories set which is Director, Manager, Administrative Staff, Teaching Staff, and Other Supporting Staff. The vast majority of respondents were Teaching Staff with a 50.3% (N=97), follows with administrative staff which is 25.4% (N=49), 15% of the respondents were Other Supporting Staff (N=29), follows with 6.2% which is Manager (N=12) and ended

with respondents which were Director 3.1% (N=6). Based on the details above we can state that Director is Underrepresented in the sample and the Teaching staff were dominating in the sample.

Respondents were asked for information on how long they have been working in the institution based on the range set for them to choose; < than 12 months, 1-3 years, 4-6 years, 7-9 years, and +10 years. The majority of the participants state they have been working up to 4-6 year with 35.8% (N=69), respondent working within 7-9 years in the institution was 26.8% (N=52), follow closely with 24.4% of respondent's state +10 years (N=47), 9.8% respondents state they have been in their institution for 1-3 years (N=19) and the lowest number of the respondent (N=6) state working less than 12 months in their institution with 3.1%.

Respondents were asked information on their time spent on work-related activities in a week. There were different categories set for select which are; less than 40 hours, 40-44 hours, 45-48 hours, and more than 48 hours. The majority of the respondent's state that they spend 40-44 hours on work-related activities a week which is 59.6% (N=115) follow by the respondent in the range 45-48 hours which is 25.4% (N=49), 10.9% of the respondent's state that they spend less than 40 hours on work-related activities (N=21) and lowest number of respondents of (N=8) state they spend more than 48 hours on work activities.

### Reliability and validity Test

Variable	Cronbach's alpha	Number of items
WLB	0.730	8
<b>Happiness at work:</b>		
Job satisfaction	0.870	5
Affective organizational commitment	0.725	5
Employee Engagement	0.756	5
Employee performance	0.637	6

Table 2: Cronbach's Alpha for all variables

Based on Table 2, the majority of the variables fell in the range of 0.7 to 0.9 which is highly reliable except for EP which in the range from 0.5 to 0.7 which is moderate reliability which is acceptable (Hinton et al, 2004).

### Multicollinearity test

Multicollinearity is used to verify the level of tolerance and Variance Inflation Factor (VIF) for each predictor variable in the construct. According to (Pedhazur, 1997, Field, 2000; and Ho, 2006), the acceptable value of tolerance and VIF Coefficient should be in the range > 0.3 and <10 respectively.

**Table 3: Multicollinearity Table**

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Work-Life-Balance	0.686	1.458
Job Satisfaction	0.468	2.135
Affective Organizational Commitment	0.531	1.884
Employee engagement	0.530	1.887

Dependent Variable: Employee Performance

Based on the Table 3 above, there are different predictor variables and all their tolerance value is above 0.3 and all the VIF is below 10, so that shows there are no Multicollinearity issues.

### Regression Analysis

The linear regression in Table 4 below illustrates a positive correlation of  $R=0.250$  between WLB and EP in the educational institution and the adjusted  $R^2=0.058$ , which indicates 5.8% of the variance is dependent on the variable EP. Table 4 shows an F ratio of  $F(1,191)=12.715$  and has a significant P-value  $=0.000$  which is less than 0.05 which means WLB is significantly predicted to EP variable and the data fit the model (Olive, 2017). Based on Table 4, we have observed the unstandardized coefficient beta, where demonstrates how much dependent variable (EP) varies with independent variables (WLB), for each unit of the WLB index, there is an increase in EP by (0.176) and the factor variable display a P-value of 0.000 which is less than 0.05, thus reject null hypothesis 1. Hence, hypothesis 1, which stated that WLB has a statistically significant impact on EP in educational institutions was supported.

**Table 4: Linear regression**

Variable	R	R Square	Adjusted R Square	d.f	F value	Sig(F)	Beta	T	Sig(t)
WLB	0.250 <sup>a</sup>	0.062	0.058	1.191	12.715	0.000 <sup>b</sup>	0.176	3.566	0.000

a) Dependent variable Employee performance

b) Predictor constant Work Life Balance

The linear regression Table 5 below, demonstrates a positive correlation of  $R=0.559$  between WLB and JS of the employee in the educational institutions and the adjusted  $R^2=0.309$ , which indicates 30.9% of the variance is dependent on the variable JS. It shows an F ratio of  $F(1,191)=86.850$  and has a significant P-value  $=0.000$  which is less than 0.05 which means WLB is significantly predicted to JS variable and the model is a good fit for the data (Olive, 2017). Table 5, shows how much variable (JS) varies with independent variables (WLB) from the unstandardized coefficient beta; as for

each unit of the WLB index, there is an increase in JS of employees in the educational institution by (0.727) and the factor variable display a P-value of 0.000 which is less than 0.05, thus reject null hypothesis 2(a). Hence, Hypothesis 2 (a) which stated that WLB has a statistically significant effect on employee's JS in educational institutions was supported.

**Table 5: Linear regression**

Variable	R	R Square	Adjusted R Square	d.f	F value	Sig(F)	Beta	T	Sig(t)
WLB	0.559 <sup>a</sup>	0.313	0.309	1.191	86.850	0.000 <sup>b</sup>	0.727	9.319	0.000

a) Dependent variable Job Satisfaction

b) Predictor constant Work Life Balance

There is a positive correlation of  $R=0.345$  is being demonstrated in the linear regression in Table 6, between WLB and AOC of employees in educational institutions and the adjusted  $R^2=0.114$ , which indicates 11.4% of the variance is dependent on the variable AOC. Table 6 below, presents an F ratio of  $F(1,191)=25.793$  follows with a significant P-value of 0.000 which is less than 0.05, which means WLB is significantly predicted to AOC variable and the model is a good fit for the data (Olive, 2017). Likewise, in Table 6, the unstandardized coefficient beta is used to perceive, how much variable (AOC) varies with independent variables (WLB); as for each unit of the WLB index, there is an increase in employees AOC towards their institution by (0.346) and the factor variable display a significant P-value of 0.000 which is less than 0.05, thus reject null hypothesis 2(b). Therefore hypothesis 2(b) which stated that WLB has a statistically significant effect on employee's AOC in educational institutions was supported.

**Table 6: Linear regression**

Variable	R	R Square	Adjusted R Square	d.f	F value	Sig(F)	Beta	T	Sig(t)
WLB	0.345 <sup>a</sup>	0.119	0.114	1.191	25.793	0.000 <sup>b</sup>	0.346	5.079	0.000

a) Dependent variable Affective Organizational Commitment

b) Predictor constant Work Life Balance

The linear regression Table 7, illustrates a positive correlation of  $R=0.357$  between WLB and EE in the educational institutions and the adjusted  $R^2=0.123$ , which indicates 12.3% of the variance is dependent on the variable EE. The table above presents an F ratio of  $F(1,191)=27.917$  and has a significant P-value of 0.000 which is less than 0.05 which means WLB has significantly predicted to EE variable and the model is a good fit for the data (Olive, 2017). The linear regression table above display an unstandardized coefficient beta, where it shows how much variable (EE) varies with independent variables (WLB); as for each unit of WLB index, there is an increase in EE by (0.342) and

display a P-value of 0.000 which is less than 0.05, thus reject null hypothesis 2(c). Hence, the hypothesis which stated that WLB has a statistically significant effect on EE in educational institutions was supported.

**Table 7 : Linear linear regression**

Variable	R	R Square	Adjusted R Square	d.f	F value	Sig(F)	Beta	T	Sig(t)
WLB	0.357 <sup>a</sup>	0.128	0.123	1.191	27.917	0.000 <sup>b</sup>	0.342	5.284	0.000

a) Dependent variable Employee Engagement

b) Predictor constant Work Life Balance

The multiple linear regression Table 8 indicates an R-value of 0.502 which display a positive correlation among variables of Happiness at Work (JS, AOC, EE) on EP in the educational institutions, and the adjusted  $R^2=0.240$ , which indicates 24% of the variance is dependent on the variable EP. The F ratio of F (3.189) =21.177 is allocated in Table 8 and has a significant P value =0.000 which is less than 0.05, that means Happiness at Work variables (JS, AOC, EE) is significantly predicted to EP variable and the model is a good fit for the data (Olive, 2017). For instance, the multiple linear regression table help in detecting the unstandardized coefficient beta, where it identifies how much dependent variable (EP) varies with different mediating variables of Happiness at Work (JS, AOC, EE) while other variables remain constant;

For each unit of JS index, there is a decrease in EP in the educational institution by (-0.071), and as well as it shows a P-value of 0.115 which is greater than 0.05, thus failing to reject null hypothesis 3(a). Hence, the hypothesis which stated that EE has a statistically significant effect on EP in educational institutions is supported.

Carry forward with another variable's happiness at work, for each unit of EE index, there is an increase in EP in the educational institutions by (0.350), follows by a P-value of 0.000 which is less than 0.05, thus reject the null hypothesis 3(b). Hence, the hypothesis which stated that EE has a statistically significant effect on EP in educational institutions is supported.

Coming with the last variable of happiness at work, for each unit of the AOC index, there is an increase in EP in the educational institution by (0.099), but has a P-value of 0.105 which is greater than 0.05, thus failing to reject the null hypothesis 3(c). Hence, the hypothesis which stated that AOC has a statistically significant effect on EP in educational institutions.

**Table 8 : Multiple linear regression**

Variable	R	R Square	Adjusted R Square	d.f	F value	Sig(F)	Beta	T	Sig(t)
Happiness at Work:	0.502 <sup>a</sup>	0.252	0.240	3.189	21.177	0.000 <sup>b</sup>			
Job satisfaction							-0.071	-1.585	0.115
Affective organizational commitment							0.350	5.489	0.000
Employee Engagement							0.099	1.627	0.105

a) Dependent variable Employee Performance

b) Predictor constant Happiness at work: (Job satisfaction, Affective organizational commitment, Employee Engagement)

## Discussion of Hypothesis Results

The current study was based on examining how WLB has an impact on EP in the education institutions, and demonstrate how mediating variable Happiness at work (JS, AOC, EE) display a statistically significant effect on EP in the educational institution and to study how WLB has an effect on the 3 variables of happiness at work (JS, AOC, EE) of employees in the educational institutions.

According to the result of Hypothesis-1, WLB has a positive significant impact on EP, as it has a  $\beta=0.176$  and a significant P-value less than 0.05. In consideration to the result, we can state that WLB enables employees in the education institution to derive their full potential at their workplace, this statement can be supported by (Baral and Bhargava, 2010) that WLB support enhances the Physical and mental comfort of an employee which tend to lead to a positive work performance from the employee.

Based on the result we can state that employee in the educational institutions can balance Work life and personal life, as in the survey majority of respondents state they spent from 40 to 44 hours in a week on work-related activities, which is 59.6%, this determines that employee in educational institutions do not neglect their family roles while engaging in work activities, this statement is aligned with (Clark, 2000) theory of work-family border, that state employee should separate work and family domains to avoid work role and family role clash. This result also links with (Hill et al, 2003) statement that state employees who can have a healthy WLB tend to result in a positive spillover and positively impact on EP in the education institutions. In fact, (Helmele et al, 2014) recommended that for organizations to enhance EP they should provide easy access to flexibility, by making employees have access to technology to facilitate work at home. In this case, administrative staff and teaching staff have a need for it for them to have more flexibility and be efficient.

Hypothesis-2 demonstrates how WLB has an effect on the 3 variables of Happiness at work (JS, AOC, EE).

Likewise, the result of Hypothesis-2(a) shows that WLB has a positive significant effect on employee JS in educational institutions, as it has a  $\beta=0.727$  and a significant P-value less than 0.05. In consideration of the result, we can state that employees in the educational institutions are happier as they might be out of family and work conflict, that can be due to WLB facilities the institution provide, and this report can be supported from (Kahn et al. 1964), which state that WLB facilities help employees to balance workload and family duties that prevent family and work conflicts, thus resulting to employee JS.

The result of Hypothesis-2(b) follows up with the WLB which has a positive significant effect on the AOC of employees in the educational institutions, as it demonstrates a  $\beta=0.346$  and a significant P-value less than 0.05. Based on the result we can say that employee can be committed to the institutions if they feel comfortable at the workplace and are able to balance their work and personal life, the statement can be supported (Liu, Ting & Gao, Jie et al, 2021), that state when employee perceived organizational support to balance work and personal life, this might result to more devotion or attachment of the employee toward the institution. This result can be related to (Helme et al, 2014) statement, which states that employees having access to WLB facilities have a lesser tendency to be absent and to leave the institution, as they feel committed to the organization.

Lastly, Hypothesis-2(c) shows that there is a positive statistically significant effect between WLB and EE, as it has a  $\beta=0.342$  and a significant P-value less than 0.05. According to the result, it shows that WLB has improved employee flexibility to help them to be more engaged in their job-related task in the institution, it can be supported with (Parker et al, 2008) statement which states if organizations tend to improve WLB programs, this will help employees to manage home life e.g. Child Care, and thus tend to have a positive contribution to the institution they will be committed toward their job tasks. (Grawith Gottschlk and Muz, 2006) argue that WLB contributes to EE as it brings JS and organizational commitment which result in a positive contribution to the involvement/productivity level of the employee.

Furthermore, Hypothesis-3 demonstrates how the 3 mediating variables of happiness at work (JS, AOC, EE) has a significant effect on EP in the education institution. Concerning the result of Hypothesis-3(a) shows that there is a negative effect between JS and EP, as it has a  $\beta= -0.071$  and a significant P-value greater than 0.05 which is 0.115. According to this result, it contradicts the past studies of (Pawirosumano et

al, 2017) which state employees JS has a significant positive impact on performance, as we can state that employees are not satisfied with their job in their institution. In regard to enhancing employee JS in the educational institution. We could be relating to (Anitha, 2014) statement, that state financial reward/ need can encourage the employee to deliver a positive outcome in the organization, as well as (Coombeer and Bamball, 2007) also state that working space, working condition is the non-financial element which can lead to employee satisfaction, which brings up EP in the organization. To sum up financial and non-financial rewards it is important to make employees satisfied with their job, for them to perform better in the educational institutions.

Carry forward with Hypothesis-3(b) where it demonstrates that EE has a positive significant effect on EP in the education institution, as it has a  $\beta=0.350$  and a significant P-value less than 0.05. The result demonstrates that employees are willing to help the educational institution to succeed by giving their full potential in their job and willing to be involved in the activities of the institute. This statement can be related to (Joo and Lee, 2017) that employees who are involved in their duties are likely to display a positive performance outcome in terms of greater productivity level.

The result of Hypothesis-3(c) demonstrates that AOC has no significant effect on EP in the education institution, as it has a  $\beta=0.099$  and a significant P-value greater than 0.05. thus, this contradicts (Sakthivel, and Jayakrishnan, 2012), which state that organizational commitment has a significant impact on the performance of an employee in the organization. Hence, this shows that employees in the educational institution are not committed or convenient with the goal and vision of the institution, which can be related with (Gyensare et al, 2017) that state employee will be committed to the organization if they have a solid conviction and acceptance of the goal, that can make them wish to be part of the institution.

## V. CONCLUSION AND RECOMMENDATION

The study is built up in consideration of the author's past research. As the research framework was established in a way to examine how WLB has an impact on EP in the educational institution. Based on the findings analyses, it can be concluded that WLB has a positive significant effect on EP in the educational institution, as it enables them to balance their family roles and work duties efficiently. Likewise, WLB enables employees to experience an increase in JS, make



them be more involved in their job, and affect their commitment towards the institution, and demonstrate that EE will bring EP to the institution. However, JS and AOC might not necessarily drive a positive effect on EP in educational institutions.

Based on the findings, the following recommendation has been brought forward for Managers, Directors, and HRM of educational institutions. As they should adopt strategies that will help in reducing employee burnout and motivate employees at work, as when they are motivated, it has an effect on employee satisfaction, engagement, and commitment towards the institution. Employees can be motivated when providing the facilities for them to participate in off-the-job training especially for teaching staff, to improve their knowledge, this will lead to employee satisfaction, and will have an effect on their performance on their job. An employee being demotivated or dissatisfied at work can be due to poor salary or higher workload which might result in health issues that affect their performance.

HRM should encourage two-way communication among directors or managers and subordinates, this will promote employee involvement and make them feel important and be part of the institution that will affect their productivity level. Those educational institutions HRM should promote effective WLB programs that create equality among employees and support them, such as implement a flexible working system which is equally fair for both genders, as 66.3% of the respondents in the survey states they have children and the majority of the respondents in the sample were married which is 68.9%, with the facilities of flexible programs, this help employees to handle issues like child care, parental care, spouse care or even for maternity leaves. This initiative might result in an effect on employee satisfaction, which can result in employee efficiency and commitment. Hence, adopting an effective HRM practice will help in enhancing employee's JS, EE that will improve EP.

Nevertheless, the study carries limited information on employees working in educational institutions in Mauritius, so future research could explore this section. The Likert scale technique was used for the study, which restricts participants to express their opinion and have more accurate results (Creswell, 2003). Those participants may respond according to what the researcher is demanding or responding in a more common manner. The future researcher could use a qualitative data collection technique that increases the accuracy of the data collected. The study was limited to the online platform for the survey, future research could use other methods like face-to-face interviews.

The study has a limited number of respondents from institutions due to the restriction of the COVID-19, so future researchers can expand their survey in larger numbers of institutions.

This study is conducted only to employees in the educational institution and the survey is restricted to limited institutions. The data collection process is carried through an online survey, due to the COVID-19 pandemic, thus restricting face-to-face interaction with participants and limiting the scope of having more respondents. The findings of the research can be generalized to all employees in educational institutions and the information can be used to improve EP in the public and private educational institutions.

This study will provide useful information to public and private educational institutions and employees working in the education institute. Those findings can be used by Directors/Managers/HRM of education institutions, for structuring appropriate programs on WLB to make their employees more productive. The finding can also be used by the government of Mauritius, to establish appropriate rules and regulations for employees in the educational institutions. Employees working in the education sectors can also refer to the finding to know what is expected from them in their institution and to know what is preventing them from being productive at work.

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# Information and Communications Technology Resources and Mobile Learning in Times of COVID-19

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## Abstract

The increase in the Use of Mobile Learning due to the technological trend and even more triggered by the COVID-19 pandemic have called into question the capabilities of the Information and Communication Technology (ICT) Resources that students have. The objective is to know the status (photograph) of the capabilities of these ICT Resources and validate if they are indeed related to the Use of Mobile Learning. Descriptive statistics were used for the analysis of satisfaction levels and inferential statistics for the corroboration of correlational hypotheses and levels of association between variables. We worked with data from 70 graduate students obtained through a survey consisting of a questionnaire of 40 Likert questions with values from 1 to 5. Satisfaction levels were high for ICT Resources (44.29% Satisfied and 32.86% Totally Satisfied) and the Use of Mobile Learning (42.86% Satisfied and 30.00% Totally Satisfied) demonstrating that many students had the ideal capabilities of ICT Resources that allowed them to use Mobile Learning. In turn, the results obtained were for Spearman's Rho (0.837 and  $p < 0.05$ ), Chi-Square (171.287 and  $p < 0.05$ ), Phi Coefficient (1.564 and  $p < 0.05$ ), Cramer's V (0.782) and Contingency Coefficient (0.843), demonstrating that between ICT Resources and the Use of Mobile Learning there was a statistically significant, strong relationship, positive and with a high degree of

dependence, where the Use of Mobile Learning depended on ICT Resources.

## Keywords

Mobile Learning, ICT Resources, Covid-19, Digital Tools, Digital Content

## 1. INTRODUCTION

Nowadays the use of mobile devices has become widespread, even many people have more than one and this trend is constantly increasing. Only in Peru, in 2019 there were about 26 million lines in service with mobile internet connection and almost 40 million lines with service on mobile devices [1]. This has allowed many students, either consciously or unconsciously, to make use of Mobile Learning. According to the portal [2] worldwide between May 2020 and 2021 Internet access from mobile phones has been 55.31%, 13.32% more than desktop computers.

While it is true that we live in times where the use of ICT has become widespread worldwide, there are still gaps in the capabilities and qualities that they offer for the proper functioning of many technologies such as Mobile Learning. Many of these technical challenges are related to infrastructure, mobile devices, application development, technical support, security, technical knowledge of instructors, students and other stakeholders, which must be taken into account when

implementing a Mobile Learning project [3]. Currently, the biggest reason why many educational institutions have had to implement online learning solutions is the COVID-19 pandemic [4], is very important to analyze the critical success factors of mobile learning in universities given that students are the main consumers of these online learning solutions, making the Technological Dimension a key success factor, determined by many enabling conditions, as well as all its capabilities and limitations [5].

According to [5], these technological problems are related to factors, such as: the stability of Internet connections, keyboard size and screen (related to difficulties in using mobile devices), which is what they demonstrate [6], when they affirm that it is one thing to have technological resources and another that these resources have the capabilities that make it possible for students to continue continuing with their studies; focusing these differences on the qualities, either of the connection or of the device, that is, if you have both, but with low levels of quality that hinder learning there is a problem in these ICT Resources, [7] proposes to study two important variables, ICT Resources and the Use of Mobile Learning, where ICT Resources groups the resources mentioned by many aforementioned researchers.

The situation in times of pandemic showed us that the problem is no longer the non-existence of ICT-based resources, but that the problem now focuses on the levels of quality, capacity, availability, functionality, ease of use, etc. that could determine that technologies such as Mobile Learning have a greater use by students. At the same time, it is important to know the current state of ICT Resources and the use of Mobile Learning in students to analyze, evaluate and determine, in terms of the respective levels of satisfaction, if they have the necessary conditions based on the dimensions of ICT Resources and to what extent they influence the use of Mobile Learning that they currently already perform. At the same time, to inform the authorities responsible for the implementation of technologies in support of education, if ICT Resources have a strong relationship with the use of Mobile Learning, so that they can make the appropriate or corrective decisions for a better use.

## II. BACKGROUND

Table 1 shows a list of some research that addresses and evaluates the same problem as our research. Two objectives are proposed: To know if students have ICT Resources with the ideal capacities to carry out their general activities and specifically to carry out Mobile Learning through the status (photograph) of the levels

of satisfaction on the capabilities of the ICT Resources they possess. Validate whether these ICT Resources are indeed an important component as they are related or not and at what level to the Use of Mobile Learning, that is, they condition the use of Mobile Learning.

**Table 1: Research Evaluating the Problem**

Research	Year	Authors
Factors Affecting the Use of Smart Mobile Examination Platforms by Universities Postgraduate Students during the COVID-19 Pandemic: An Empirical Study	2021	[8]
Evaluating and Ranking Mobile Learning Factors Using a Multi-criterion Decision-making (MCDM) Approach	2021	[5]
The Digital Divide in Spanish Students in the Face of the Covid-19 Crisis	2121	[6]
Features, barriers, and influencing factors of mobile learning in higher education: A systematic review	2021	[9]
Empirical investigation to explore factors that achieve high quality of mobile learning system based on students perspectives	2016	[10]
Systematic review on the state of the art of methodologies for M-Learning	2020	[11]
Perceptions and challenges of mobile learning in Kuwait	2016	[3]
Mobile telephony in the classroom: digital divide and absence of didactic strategies	2014	[12]

## Variables

Each of the variables were made up of 5 dimensions and each dimension by 4 indicators. In Table 2 you can see the variables with their respective dimensions, as well as the number of questions per dimension within the questionnaire.

**Table 2: Research Variables and their Dimensions**

Variable	Dimension	Question
ICT Resources	Internet connectivity	1-4 (4)
	Mobile Device	5-8 (4)
	Digital Tools	9-12 (4)
	Digital Content	13-16 (4)
	Training in the Use of ICT Resources	16-20 (4)
Using Mobile Learning	Internet connectivity when using Mobile Learning	21-24 (4)
	Mobile Device when using Mobile Learning	25-28 (4)
	Digital Tools When Using Mobile Learning	29-32 (4)
	Digital Content when using Mobile Learning	33-36 (4)
	Training in the use of ICT resources when using Mobile Learning	36-40 (4)



The ICT Resources, defined by each of the 4 indicators in each of the 5 dimensions that make up this variable, where the capabilities of these are used by the student in a general way allowing him to perform many activities remotely and which in turn are independent of the technology they support, such as: Electronic Learning, Electronic Commerce, Multimedia Content, Social Networks, etc. [13] makes us aware of many of the attributes, problems, limitations and capacities of a technical nature that would be part of these ICT Resources, so it can be said that they would condition their satisfaction levels; likewise, due to the COVID 19 pandemic, they have become a main actor, not because they do not exist, but because those that already existed were not enough to cover the new demands, as they point out [14] are playing an increasingly important role in education and that the pandemic had generated a massive increase in the use of ICTs, increasing the number of barriers and problems in emerging countries; that is why, for our research, it is very important to study the Technological Dimension formed by ICT Resources, because it is one of the most important Critical Success Factors for the success of Mobile Learning [5].

The Use of Mobile Learning, defined in the same number of factors and dimensions as ICT Resources, with which satisfaction levels are measured based on the ICT Resources that support only when Mobile Learning is used, that is, on the ICT Resources that the student uses specifically to perform any task or activity in relation to their learning. From the perspective of Digital Divide, according to [15] inequalities that may exist related to the use of technology and, in turn, is a phenomenon made up of several dimensions, which means that there are different types of gaps, one of them being the Use Gap. The proposed research model and process to determine the relationship between the two variables is based on some research, such as those proposed in their respective master's thesis by [16]; [17]; [18]; [19]; [20].

The dimensions of our variables have been defined taking as references the research of [23], [24], [10], [25], [26], [27], [28], [29] as well as several of the areas of the Mobile Learning Maturity Model referred to by [30] in his article called "A Framework for Progress in Mobile Learning".

#### Indicators by Variables

The indicators specified in Table 3 have an origin in terms of quality, either on the capabilities and functionalities, given that the quality of the service in all these ICT Resources positively influences the adoption of Mobile

Learning by students, as manifested by [31], stating that students would be willing to adopt mobile learning systems when the quality of service is perceived as good and beneficial to their studies, in turn, this quality of service is perceived in terms of response time, reliability, security and quality of content; so in our research like [32], we take as a reference some Frameworks that are used to evaluate Quality in E-Learning, such as: Rubric for Online Instruction (Online Organization & Design, Instructional Design & Delivery and Innovate Teaching with Technology), ECB Check (Media Design and Technology: Equipment & Infrastructure) and Quality Matters (Accessibility and Usability); as well as, some of the features and sub-features of Software Quality Standards, such as ISO/IEC 9126, such as: Functionality (Suitability and Interoperability), Compatibility, Usability (Operability and Attractiveness), Reliability, Efficiency (Use of resources) and Quality of Use, as well as the 6th International Scientific Congress on Research, Development and Innovation ISTE - CIDi (2022). [33] in Information and Communications Technology Resources and Mobile Learning in Times of Covid-19 as well as [34], ISO/IEC 25010:2010 (SQuaRE), such as: Functionality (Suitability), Reliability (Availability), Usability (Operability, Accessibility), Portability (Adaptability), Efficiency (Behavior over time and Use of resources) and Quality of Use (Effectiveness, Productivity, Satisfaction and Context of Use).

**Table 3: Indicators of the Dimensions of the ICT Resources Variable**

Dimension	Indicator
Internet connectivity	Signal Coverage
	Bandwidth
	Internet Connection Availability
	Internet Connection Performance
Mobile Device	Processor Performance
	Storage Memory Capacity
	Screen Size
	Ease of Use
Digital Tools	Availability of Digital Tools
	Functionalities of Digital Tools
	Interoperability between Digital Tools
	Ease of Use of Digital Tools
Digital Content	Content Availability
	Presentation of the Contents
	Content Management
	Quality of Content
Training in the use of ICT resources	In the use of Connectivity
	In the use of the Mobile Device
	In the use of Digital Tools
	In the use of Digital Content

### III. METHODOLOGY

The methodological process is directed under the paradigm of Correlational Descriptive, Analytical Purpose, Cross-sectional Time Sequence, Control of Observational Assignment and Start of Retrospective Study. The universe was Finite, and the Analysis Unit was made up of 295 Graduate students of the Faculty of Systems Engineering and Informatics (FISI-UNMSM), where the inclusion criteria were: to be a student with regular enrollment in a Postgraduate program (Master, Doctorate or Diploma) in the academic semester 2021-II and not have a digital divide in ICT Resources or digital divide for the Use of Mobile Learning. The sample consisted of 70 students. The sample was obtained by means of simple random probability sampling. It was carried out through a single survey that was carried out virtually through a Google form. The link to the survey was sent via email through the Graduate Unit of the FISI-UNMSM.

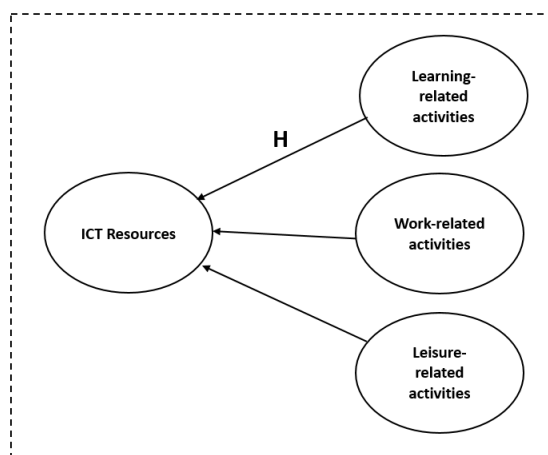
The Survey technique was used and a Questionnaire as an instrument. The questionnaire consisted of two parts, the first part for the capture of some demographic data such as: Gender, Academic Level and Age. The second part consisted of a questionnaire of 40 questions. The answers were based on a Likert-type scale, where 1 was Totally Dissatisfied, 2 was Dissatisfied, 3 was Regularly Satisfied, 4 was Satisfied, and 5 was Totally Satisfied. After the survey was completed, all the data was downloaded into an Excel file.

For Descriptive Statistics, MS Excel and SPSS statistical software were partly used; in turn, for Inferential Statistics, only SPSS statistical software was used to process the data and determine the hypothesis checks. First, we proceed to determine the distribution of the data of our variables by means of the Kolmogorov-Smirnov test [35]. The result of the normality tests showed us that the distributions of the data of both variables were not normal, so the Non-Parametric Test of Spearman's Rho Correlation Coefficient should be used according to [35], [36]; Spearman's Rho Coefficient was used to statistically relate Likert-type scales since we consider our categorical ordinal variables, as stated by [37]. At the same time, Chi-square was used as an alternative and comparative mode [38], [39]. In turn, other coefficients were used to validate these correlations, such as: Phi Coefficient, Cramer's V Coefficient and Contingency Coefficient [39], the confidence interval used was 95% with a margin of error of 0.05%. Table 4 shows the decision criteria for each of the statistics used.

**Table 4: Decision Criteria of Statisticians**

Statistical	Criteria	References
Kolmogorov-Smirnov test	$P \leq 0.05$ , non-normal distribution $P > 0.05$ , normal distribution	[35], [36], [18]
Non-Parametric Test	Close to 1, strong and positive correlation	[35], [36],
Spearman's Rho coefficient	Close to -1, strong and negative correlation	
Pearson's Chi-Square	$P \leq 0.05$ , $H_1$ accepted $P > 0.05$ , $H_0$ accepted	[40], [41], [42], [39], [43]
Coefficient Phi (Intensity of Association)	-1, perfectly negative relationship 0, no association 1, perfectly positive relationship	[37], [43], [44]
Cramer's V coefficient (Relationship Intensity)	0-0.2, no association 0.2-0.6, Moderate Association 0.6-1, strong partnership	[37], [43], [44],
Contingency Coefficient (Relationship Intensity)	$0 \leq C \leq 1$ Close to 0: lower intensity of dependence. Close to 1: higher intensity of dependence.	[37], [43], [44]

According to the model [45], proposed in Figure 1, we can see that today we basically carry out three categories of activities related to the use and consumption of ICT Resources, such as: activities related to work, fun and obviously learning; which leads us to think, if these same ICT Resources will have the same performance in all categories of activities that are carried out, and even more specifically when tasks or activities related to learning are carried out from a mobile device, that is, when we make use of a particular technology such as Mobile Learning.



**Figure 1: Model of the Relationship between ICT Resources and the Use of Mobile Learning**

#### IV. DATA ANALYSIS

According to Table 5, at the gender level, men have been the most participatory, surpassing women by 48,572%, in turn, at the academic level, master's students represent the vast majority with 80,000%, with doctoral students having the lowest participation with 7,143% of the total. At the age level, the highest participation is among students between the ages of 31 and 40 with 37,143%, with the oldest being the least representative with 7,143%; However, the youngest of the group between 20 and 30 years old have an important participation with 27,143% of the total. It is important to highlight that young people between 20 and 30, who are those who belong to the so-called Generation Z are represented in 27,143%, since they represent those who have the greatest attachment to technology.

**Table 5: Demographic Analysis**

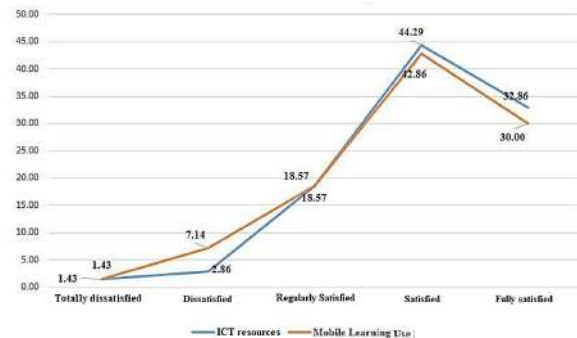
Indicator	Category	Quantity	Percentage	Total
Gender	Male	52	74.286 %	100%
	Female	18	25.714 %	
Academic Level	PhD	5	7.143 %	100%
	Mastery	56	80.000 %	
Age	Graduate	9	12.857 %	100%
	20-30	19	27.143 %	
	31-40	26	37.143 %	
	41-50	20	28.571 %	
	51-60	5	7.143 %	

#### 4.1 Descriptive Analysis by Variable



**Figure 2: Relative Frequencies in Percentages by Level of Satisfaction and Variable**

The percentages of the Relative Frequencies of each of the variables according to the Satisfaction Levels are shown in Figure 2, where the percentage of the level of satisfaction "Totally Dissatisfied" is equal for both variables with 1.43%, on the other hand, the level of satisfaction with the highest percentage in both variables is the "Satisfied" with 44.29% for ICT Resources and 42.86% for the Use of Mobile Learning, in turn, the second highest percentage is the level of satisfaction "Totally Satisfied" with 32.86% in ICT Resources and 30.00% for the Use of Mobile Learning; however, for the Use of Mobile Learning in the level of satisfaction "Unsatisfied" there is 4.29% more than in ICT Resources.



**Figure 3: Comparison of Satisfaction Level Between Variables**

On the other hand, according to Figure 3, the perception of satisfaction levels (Satisfied and Totally Satisfied) between the two variables is very similar, which shows that the ICT Resources available to the postgraduate students of the FISI-UNMSM are within the appropriate capacities that allow them to carry out activities related to their learning from a mobile device, that is, the Use of Mobile Learning. There is also a slight difference of 4.29% of the level of satisfaction "Dissatisfied" added to the 1.43% of the level "Totally Dissatisfied" and added to the 18.57% of the level "Regularly Satisfied" is the GAP in terms of capabilities of ICT Resources that need to be aligned so that graduate students of the FISI-UNMSM can fully exploit the benefits offered by the Use of Mobile Learning. Although postgraduate students have the economic resources to have the best ICT resources, there is still almost 24% dissatisfaction with their ICT resources, which shows the GAPS in the limited capacities currently offered by the providers of these ICT Resources or perhaps the same market and everything that may imply. In other words, a graduate student can have the money to buy a mobile device with the best capabilities to make use of Mobile Learning, but there is no operator network that supports it or wants to have an internet network that has a better capacity to use Mobile Learning, but in the area where he lives there is no type of technology or coverage is not very good. That is why, it is not enough to have access to these ICT Resources, perhaps the internet connection is enough to surf or make some purchases or payments via the internet, but insufficient to attend classes for hours. Therefore, from a point of view of Satisfaction Levels (indirectly Quality), as stated [9] one of the barriers to the use of Mobile Learning is Technology, that is, if the ICT Resources available do not have the appropriate capabilities and functionalities, the benefits of Mobile Learning cannot be exploited to the maximum and therefore, become a barrier, which is evidenced by

having obtained both at the level of ICT Resources and the Use of Mobile Learning very high indicators in terms of Satisfaction Levels, also corroborating what they affirm [4] that the main parameter that promotes the use of a mobile exam platform, is Quality.

#### 4.2 Instrument reliability analysis.

The results of the reliability analysis of Cronbach's alpha for the entire instrument were 0.98. Regarding the variables: ICT Resources obtained a Cronbach's Alpha 0.973 and Mobile Learning Use 0.984.

**Table 6: Results of Cronbach's Alpha Analysis by Variable Dimension**

Variable	Dimension	Cronbach's alpha
ICT Resources	Internet connectivity	0.974
	Mobile Device	0.942
	Digital Tools	0.943
	Digital Content	0.961
	Training in the use of ICT resources	0.955
Use of Mobile Learning	Internet connectivity when using Mobile Learning	0.966
	Mobile Device when using Mobile Learning	0.977
	Digital Tools When Using Mobile Learning	0.964
	Digital Content when using Mobile Learning	0.969
	Training in the use of ICT resources when using Mobile Learning	0.979

According to the results of Table 6, the values of Cronbach's Alpha are within very high levels, between the range of 0.8 to 1 according to [20], so the instrument used in the research to obtain the data has a very high reliability, as can be corroborated as stated in the master's theses of [17], [41] and [46].

#### 4.3 Normality Tests.

To determine whether the data come from a Normal or Non-Normal Distribution we use the Kolmogorov-Smirnov Normality Test, whose condition is that the sample is greater than 50 as stated [35].

Based on the results of Table 7, the p-value values are 0.000 (Asymptotic Sig.) in both variables being in turn less than 0.05 (significance level); therefore, it is concluded that the data of both variables come from a Non-Normal Distribution; therefore, the Nonparametric Test of Spearman's Rho Coefficient should be used to determine the Level of Association or Independence

between the variables, as stated [35] and [36], in their respective research papers.

**Table 7: Results of the Kolmogorov-Smirnov Normality Tests**

		ICT Resources	Using Mobile Learning
Parameters Normal	Stocking	4.04	3.93
	Desv.	0.875	0.953
	Standard		
Maxims Differences Extreme	Absolute	0.252	0.258
	Positive	0.191	0.170
	Negative	-0.252	-0.258
Static Test		0.252	0.258
Asymptotic sig. (bilateral)		0.000	0.000

#### 4.4 Hypothesis Check

We define the Null Hypothesis as H0 and the Alternative Hypothesis as H1:

H0: Isn't there a statistically significant relationship between ICT Resources and the Use of Mobile Learning?

H1: Is there a statistically significant relationship between ICT Resources and the Use of Mobile Learning?

**Table 8: Results of the Nonparametric Test of Spearman's Rho Coefficient**

		ICT Resources	Using Mobile Learning
ICT Resources	Correlation Coefficient	1.000	0.837*
	Sig. (bilateral)	-	0.000
Using Mobile Learning	Coefficient of Correlation	0.837*	1.000
	Sig. (bilateral)	0.000	-

Based on the results obtained in Table 8, the value of the Correlation Coefficient is 0.837 and the value of the significance level is 0.000, which in turn is lower than the significance level 0.05; therefore, the Null Hypothesis H0 is rejected and the Alternative Hypothesis H1 is accepted, As corroborated by the statement by [47], therefore the existence of a statistically significant relationship between the two variables is demonstrated, with the Correlation being strong and positive because the value of the Correlation Coefficient is very close to 1. This result corroborates the results of [27], in his master's thesis where he determined the existence of a factor called Infrastructure and that this has a great influence on the use of Mobile Learning. Likewise, [5], state that of 4 factors found that influence and facilitate the use of Mobile Learning, one is the Technological Dimension. In turn, [26], successfully tested five factors in the application of Mobile Learning, one of them, the Infrastructure Factor, because they consider that the effectiveness of learning requires a good IT Infrastructure. All the research refers in some way to ICT Resources, corroborating the existence of a relationship between these technological factors embedded within ICT Resources and the Use of Mobile



Learning as evidenced by hypothesis testing.

**Table 9: Chi-Square Test Results**

	Value	Mexico City	Signification Asymptotic (bilateral)
Pearson's Chi-Square	171.287	16	0.000
Likelihood Ratio	96.938	16	0.000
Linear association by linear	52.530	1	0.000

The results of Table 9 show that the Chi-square value is 171.287 with 16 degrees of freedom and an Asymptotic Significance of 0.000, this value being lower than the significance level 0.05; so, the Null Hypothesis H<sub>0</sub> is also rejected and the Alternative Hypothesis H<sub>1</sub> is accepted. With respect to the Likelihood Ratio, whose value is 96.939 and with an Asymptotic Significance of 0.000 that is also less than 0.05 confirms that H<sub>0</sub> must be rejected and H<sub>1</sub> must be accepted, determining that there is a dependency relationship between the variables. In relation to the statistical Linear Association by linear or Correction by Continuity of Yachts, whose values are 52,530 and 0,000, the same conclusions (with respect to the hypotheses) reached with Chi-Square and the Likelihood Ratio are confirmed.

**Table 10: Results of Chi-Square-Based Symmetric Measurements**

	Value	Signification Approximate
Phi	1.564	0.000
V of Cramer	0.782	0.000
Contingency Coefficient	0.843	0.000

Based on the results of Table 10, all values of the Approximate Significance of the statistics are 0.000, which in turn are lower than the significance level of 0.05; therefore, the Null Hypothesis H<sub>0</sub> must also be rejected and the Alternative Hypothesis H<sub>1</sub> must be accepted; with which, it is affirmed that ICT Resources and the Use of Mobile Learning are Associated. According to the value of the Contingency Coefficient 0.843, there is a high degree of dependence between the variables because it is a value very close to 1. As for the value of the Phi Coefficient 1.564, it is determined that the relationship between both variables is strong and directly proportional. Finally, the value of Cramer's Coefficient V 0.782, indicates that the association between the variables is strong because its value is greater than 0.6.

Today and increasingly in the not too distant future, almost nothing can be done without the use of these ICT Resources, and education is no exception as demonstrated [24], which determine the existence of Technological Factors that have a preponderant role in the use of Mobile Learning. As stated by [6], it is not enough to have Technology if it does not make it possible to continue with the studies, as ICT Resources are strongly related to the Use of Mobile Learning, it

is very important to be able to investigate in greater depth the ICT Resources and more specifically the dimensions that compose it, which are the basis on which Mobile Learning operates, In order to validate if the capabilities of these will have the same level of performance when tasks or activities related to mobile learning are carried out, and even more, after having verified at a high level the existence of the relationship between the variables that contain them, that is why we propose the realization of a future research that allows to analyze in detail each of the dimensions of the ICT Resources with respect to the Use of the Mobile Learning, to determine if there is a statistically significant relationship between each of the dimensions of ICT Resources (Internet Connectivity, Mobile Device, Digital Tools, Digital Content, and Training in the use of ICT Resources) and the Use of Mobile Learning.

## V. CONCLUSIONS

Given the high levels of satisfaction obtained from graduate students at the level of ICT Resources (44.29% Satisfied and 32.86% Totally Satisfied) and the Use of Mobile Learning (42.86% Satisfied and 30.00% Totally Satisfied), it is demonstrated that students do have ICT Resources with the ideal skills to carry out their activities related to their learning, that is, make use of Mobile Learning.

The statistical results determine the existence of a strong and positive correlation (0.837) between ICT Resources and the Use of Mobile Learning with a very high degree of dependence (0.843), where the Use of Mobile Learning depends on ICT Resources, with which it can be concluded that ICT Resources and their dimensions that make them up form an important component with respect to the Use of Mobile Learning by students and which in turn conditions its use.

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# Digital Marketing Strategy to Improve Positioning Case: Association in Lambayeque, Peru

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## Abstract

The present investigation had as a general objective to apply the digital marketing strategy to improve the positioning of an association in Lambayeque. The type of research was descriptive, with a pre-experimental design, it is a study where the dependent variable is the positioning and the independent variable is the digital marketing strategy. The study population consisted of 150 members of the association, where a convenience sample of 80 members was considered. Among the most important results, a resounding 38 percent of the respondents stated that the positioning strategies are not adequate, and they do not feel identified with the association; while after applying the post test it was found that the clients of the association recognized the achievement in 61%, with respect to the quality service it is stated that 52% do recognize that the association provides a quality service.

## Keywords

Positioning, Strategy, Brand, Digital Marketing

## I. INTRODUCTION

Today the positioning that companies achieve is crucial and important to prevail in the market, this has allowed businesses to have a good reputation with respect to the competition. Positioning, according to Kotler

and Armstrong (2021), is to ensure that the product or brand occupies a clear place in the market and is desirable for its consumers. In turn, digital marketing is a new way of positioning a company through social networks, which is why organizations that want to remain with their businesses in the market have chosen to implement strategies where they can interact with future customers online. and real time, to provide them with all the required information and achieve better interactivity with their future clients. However, there are companies that lack digital tools, either due to lack of information or are unaware of the advantages they offer. Traditional companies are afraid to implement today's technology for fear of rejection from their loyal consumers.

In the study of digital marketing strategies used by sports retail companies carried out by Luque-Ortiz (2021), it is based on determining how effective marketing strategies are currently using digital search engines in sports retail companies, this research has taken as case study the multi-sport stores Decathlon and Sprinter due to the importance that both brands have in the sports sector. The methodology used was descriptive analysis through the study of various factors related to digital marketing, such as SEO search engine positioning (Search engine Optimization, for its acronym in English), web usability and the creation of advertising campaigns SEM (Search Engine Marketing,

for its acronym in English. The information was obtained using different tools used in digital marketing such as Semrush and Screaming. Frog. It is concluded that, despite the fact that both companies make notable efforts, the results are very uneven. Decathlon develops more effective and useful digital marketing strategies for brand consolidation in terms of reputation and sales, while Sprinter presents areas of constant improvement.

Another of the studies was Urrutia (2021), who proposes as an objective know how brand positioning is related to the level of purchase through social networks in IPEX company. in the studio one approach prevails quantitative , with a non-experimental design , type correlational descriptive cross section . The population made up of 500 people and a sample of 218 clients and users through social networks . was used as instrument to the questionnaire with Likert scale and the value of Cronbach's Alpha for brand positioning ( 0.9489 ) and for the level of purchase by social networks (0.9265). the results demonstrated a relationship positive high, with a Spearman's Rho (0.846) and the significance test with a p-value=0.000<0.05. Where it is concluded that if the brand positioning is higher the level of purchase in social networks is greater.

Digital marketing allows reaching markets that the traditional one does not, through digitization in order to take a new course of application of strategies for business development articulating communications and technology. The unit of analysis of the present investigation was Home Center SA, which markets finishes for construction that carries out its activities in different cities of the country, whose identified problem is the deficient generation of economic income that causes insufficient investment in the necessary implements to expand the business, for which is proposed as an objective to develop digital marketing strategies 2.0. The study was descriptive, its most relevant results were the lack of positioning and notoriety of the brand for not being found on social networks, which generates ignorance of the service in the market. (Mena- Clerque & Mena- Clerque , 2021).

The study proposed by Carrasco (2020), refers that digitalization is extremely challenging for many companies and dabbling in digital advertising and social networks , has gone from being an " anecdotal " fact to a necessity imperative . The type of investigation was basic , non-experimental design , cross-sectional, focus mixed , the technique was used survey and instrument It was a questionnaire , applied to a sample out of 160 consumers of products with advertising on Facebook, documentary analysis allowed analyze the

effect of strategies advertising , where the conclusion was that the digital branding of brands influences in the purchase decision . \_ In addition , he concluded that it is important Know the target and design a strategy according to the objectives of the brand.

The construction industry has not been an early adopter of social media and digital marketing, due in large part to a lack of knowledge and skills in these areas. However, effectively implemented digital and social media marketing can be a disruptive force allowing smaller residential construction companies to build brand awareness and win business from larger competitors. This study uses a qualitative approach: interviews with small and medium-sized enterprises (SMEs) in residential construction and adjacent industry players, to obtain data that addresses the key questions of digital marketing attitudes and capabilities of SMEs in the construction sector. residential; whether digital and social media marketing is as effective or more than traditional marketing strategies; and the challenges that SMEs face in making effective use of digital marketing strategies. The findings confirm the widespread recognition of the value of digital marketing strategies among SMEs, but reveal that the adoption and effective use of digital marketing is undermined by deficiencies in the analysis of the external environment and the lack of necessary investment and training. to plan, monitor and keep effective and up-to-date. - Updated marketing mixes, strategies and objectives. Based on the results, recommendations are offered to improve the acceptance and effective use of digital and social media marketing by residential construction SMEs. ( Malesev & Cherry, 2021).

One of the companies that has been successful due to the use of marketing strategies in social networks has been in Peru BEMBOS, this company implemented the use of the community manager in networks. The BEMBOS brand applied digital marketing strategies, resulting in positioning itself as one of the best brands and has achieved great acceptance, also getting the same users to do the work of the community manager, through sharing the experiences lived in the establishments, through of their social networks and thus capture future consumers, one of the lessons we should know is not to get angry when people make offensive comments on the company's fan page. To do this, we must have a positive approach when responding so as not to overshadow the business and its customers.

Technology has been evolving and the use of traditional marketing has been replaced by digital marketing, in the association, subject of study, a virtual

platform (fan page) was implemented, however, it is not properly structured and the follow-up to partners is inefficient. Currently the association provides the services of Hotels, Restaurants and related, notably highlights the lack of interaction and monitoring of partners, which generates the outdated database of partners (birthday, address, mail, telephone, ruc, legal representative, name and contact number, company name), scarce and updated database of associates for immediate information among members and partners, in such a way to achieve a better reach to them and to be able to position the brand with the dissemination of promotions, training, future events or legal or accounting advice that associates need. The fan page not only consists of the creation but also the constant updating of the activities it carries out, which is why, in recent years, it has been losing partners and trust among its affiliates.

## II. RESEARCH DESIGN AND METHOD

### Guy

The type of research was mixed, a pre-experimental design.

### Design of the investigation

The research presents a pre-experimental design.

### Goals

#### General

Apply the digital marketing strategy to improve the positioning of the Association in Lambayeque.

#### Specific

Analyze the positioning of the association before applying the digital marketing strategy through the pretest.

Design the digital marketing strategy of the Association to improve the positioning of the digital platform.

Identify the level of positioning of the Association after applying the digital marketing strategy through the post test.

### Study Variables

#### Dependent variable:

positioning

Marketing positioning refers to the perception that consumers have about a product, brand or company compared to its competitors in the market (Grewal & Levy, 2021).

#### Independent variable:

Digital Marketing Strategy

"Digital marketing strategy" refers to the action plan used to promote products or services through digital channels (Chaffey & Ellis-Chadwick, 2019).

### Population and sample

#### Population

It was made up of 150 members of the association. (See table 1). Population is the set of individuals to whom a study is carried out in accordance with the objectives of the investigation (...), that is, the participants in the problem under study. (Arias, 2006)

#### Inclusion criteria

Members of the Association in the profile of establishments in the hotel industry.

#### Exclusion criteria

Members of the Association in the profile of establishments in the restaurant business and related companies.

The study subjects were considered the members of the association as businessmen, with hotel, restaurant and related assets in the department of Lambayeque.

**Table 1: Total of population of the institution of study**

Sectors	Members
<b>Restaurant sector</b>	fifty
<b>Hotel sector</b>	80
<b>related sectors</b>	twenty
<b>Total</b>	150

*Fountain: Information base of the data obtained in the association.*

### Sample

To determine the study sample, Arias (2006) maintains that "it is the subset that represents the population with certain characteristics in common", where the non-probabilistic sampling method was used, for which according to Hernández (2014) mentions that it is of type for convenience because only 80 members were selected because they are the ones who have the knowledge.

### Data collection techniques and instruments, validity and reliability

#### Survey

The survey is a technique that helps the collection of information, for the implementation of questions according to the investigation.

Arias (2006), "The survey is used as a data collection technique aimed at internal clients and users in general in the Lambayeque region, it will allow information to be

collected to determine the internal analysis as well as to diagnose the organization against its development with the competence.”

#### Questionnaire

He refers that it is an instrument that counts questions shaped according to the investigation, which helps to collect information that contains a series of questions that can be open or closed. (Arias, 2006).

#### Validity

Hurtado & Toro (2007), the validity technique is the verification of the variables and the meaning of the questions, since they must be consistent with your objectives set out in the survey, in order to have better results. In the investigation, validity was carried out by expert judgment.

#### Data analysis method

The statistical process was disclosed through Microsoft Excel to highlight the graphs, in turn the SPSS STATICS tool was used for the reliability analysis of the research techniques.

#### Method Inductive

It is a procedure that goes from the individual to the general, as well as being a systematization procedure that, based on particular results, tries to find possible general relationships that support it. (Gomez, 2012)

### III. RESULTS

The findings obtained in the investigation are shown, which were found by the instrument used in the pre-test and post- test.

Results of the survey carried out on the study subjects Next, the results are reported with respect to the objectives set.

#### Analysis of results according to specific objectives

Table 2: Positioning level through the Pre-Test

Valid	Frequency	Percentage
Low	456	38.0
Half	229	19.1
High	515	42.9
<b>Total</b>	<b>1200</b>	<b>100.0</b>

Source: Positioning questionnaire database

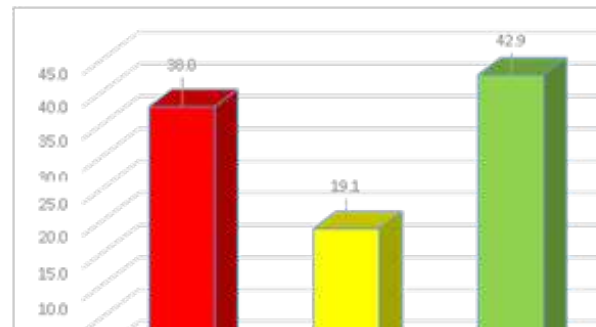


Figure 1: Positioning level result.

Note:

In the survey carried out on all the members of the association, it was revealed that 42.9% of respondents identify with the association, however, a resounding 38% of respondents state that the positioning strategies are not adequate, and do not feel identified with the association, while 19.1% are indifferent regarding the level of positioning of the association.

Table 3: Level of positioning to through of the Post-Test

Valid	Frequency	Percentage
Low	321	26.8
Half	132	11.0
High	747	62.2

Fountain: Base of data of the questionnaire positioning

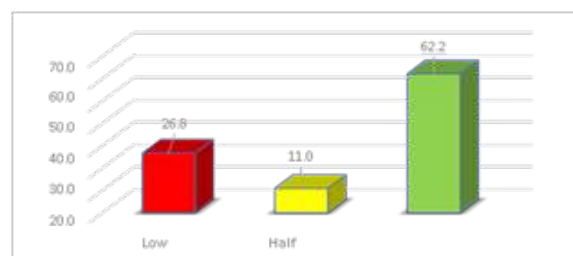


Figure 2: overall rating from the post test

Note:

It can be seen that of the total number of respondents, 26.8% have not agreed to the different strategies applied by the organization, while 11% are indifferent, however, a resounding 62.2% have found positive points and identify with the association, as a result. of the different strategies applied in the investigation.

#### Analysis of Results according to Dimensions of the Pre-Test

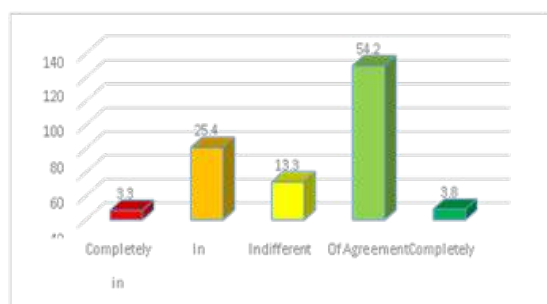
Multiple Responses by Dimensions of the positioning level through the Pre-Test.



**Table 4: Total assessment of guided recall (pre-test)**

Valid	Frequency	Percentage	% valid	% acc .
<b>Strongly Disagree</b>	8	3.3	3.3	3.3
<b>In disagreement</b>	61	25.4	25.4	28.8
<b>Indifferent</b>	32	13.3	13.3	42.1
<b>in agreement</b>	130	54.2	54.2	96.3
<b>Totally agree</b>	9	3.8	3.8	100.0
<b>Total</b>	240	100.0	100.0	

Source: Database of the positioning questionnaire.



**Figure 3: Presence of organization announcements on the fan page.**

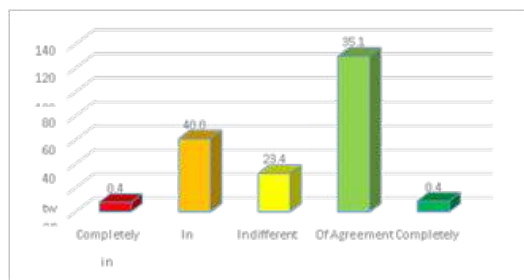
Note:

Taking into account the total assessment of guided recall, it can be seen that there are 3.3% and 25.4% in disagreement, while 54.2% and 3.8% agree, which reveals that there is a large percentage of partners who feel dissatisfied with regard to the level of recall of the brand, for which it is necessary to establish actions for change.

**Table 5: Total assessment of attributes associated with the brand (pre-test)**

Valid	Frequency	%	% valid	% accumulated
<b>Strongly Disagree</b>	3	0.4	0.4	0.4
<b>In disagreement</b>	320	40.0	40.0	40.4
<b>Indifferent</b>	187	23.4	23.4	63.8
<b>in agreement</b>	281	35.1	35.1	98.9
<b>Totally agree</b>	9	1.1	1.1	100.0
<b>Total</b>	800	100.0	100.0	

Fountain: Base of data of the questionnaire positioning.



**Figure 4: Total valuation of attributes related to the brand.**

Note:

The total assessment of the attributes related to the brand can be seen, where 40% of the surveyed customers disagree, which means the lack of strategies that allow adequate recall and positioning of the brand in the association under study.

**Table 6: Total evaluation of recommendation (pre-test)**

Valid	Frequency	%	% valid	% accumulated
<b>Strongly Disagree</b>	23	14.4	14.4	14.4
<b>In disagreement</b>	41	25.6	25.6	40.0
<b>Indifferent</b>	10	6.3	6.3	46.3
<b>in agreement</b>	58	36.3	36.3	82.5
<b>Totally agree</b>	28	17.5	17.5	100.0
<b>Total</b>	160	100.0	100.0	

Fountain: Base of data of the questionnaire positioning

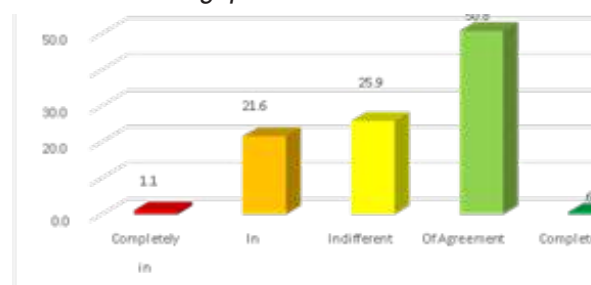
Note:

It can be seen that 5.0% and 13.3% are indifferent, while 81.7% agree, which reveals that there is a large percentage of customers who feel dissatisfied with regard to the level of brand recall and no actions are being established to reverse this.

**Table 8: Total assessment of attributes associated with the brand (post-test)**

Valid	Frequency	Percentage	Percentage valid	Percentage accumulated
<b>Completely in Disagreement</b>	9	1.1	1.1	1.1
<b>In Disagreement</b>	173	21.6	21.6	22.8
<b>Indifferent</b>	207	25.9	25.9	48.6
<b>in agreement</b>	406	50.8	50.8	99.4
<b>Completely of Agreement</b>	5	.6	.6	100.0
<b>Total</b>	800	100.0	100.0	

Source: Positioning questionnaire database



**Figure 7: Assessment total of attributes related to the brand (post - test)**

Note:

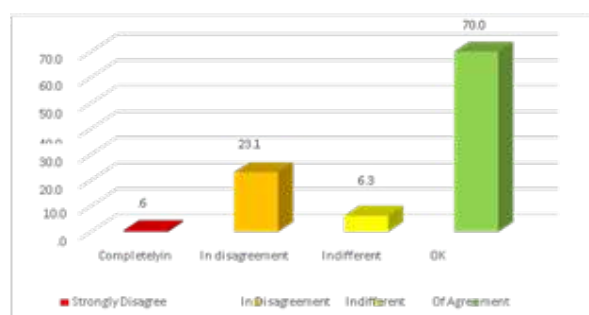
The total assessment of the attributes related to the brand can be appreciated, where 50.8% of the clients surveyed agree, which means that the strategies are adequate and allow adequate recall and positioning of the association.



**Table 9: Total recommendation rating (post-test)**

Valid	Frequency	%	% valid	% accumulated
Completely in Disagreement	9	1.1	1.1	1.1
In Disagreement	173	21.6	21.6	22.8
Indifferent	207	25.9	25.9	48.6
in agreement	406	50.8	50.8	99.4
totally agree	5	.6	.6	100.0
Total	800	100.0	100.0	

*Fountain: Base of data of the questionnaire positioning.*



**Figure 8: Total recommendation rating**

Note:

It is appreciated that 23% of those surveyed would not recommend the brand due to various factors found in the association, however, 70% agree with the services provided by the association and if they would recommend the company; Taking this context into account, it is emphasized that the association has attributes that it must take advantage of to be able to face the weaknesses that afflict it, and thus generate a change in the minds of the clients since they are the most valuable asset of the organization.

#### IV. DISCUSSION

In the present chapter HE they will give to know all the results obtained product of the instruments applied in the course of the investigation, these instruments have been validated by three expert judgments on the subject, likewise, a statistical analysis for the survey applied where HE got a Cronbach's alpha greater than 0.8, which means that the study questions do keep relationship with the indicators of the investigation; he chapter also answers to the specific objectives established:

a) Analysis of the positioning of the association before applying the strategy of marketing digital through the pretest.

The present study, according to the pre-test applied to a study sample of 80 associates, analyzed the current situation regarding positioning, that 42 percent identify with the association, however, a resounding 38 percent of those surveyed state that the strategies positioning

are not adequate, and they do not feel identified with the association, while 19 percent are indifferent regarding the positioning. This research differs from the thesis put forward by García and Yépez (2014) because in their research they did not carry out an in-depth analysis to determine what type of strategies to apply in order to implement a marketing plan that helps position Banco Austro in the city of Guayaquil, likewise, it was concluded that the marketing area for the promotion and dissemination of credit cards is lacking, which is why this is reflected in the profitability of the company and the established goals and objectives were not achieved. However, it coincides with the research by Bang & Hell (2015), entitled Digital Marketing Strategy Social media and its contributions to competitiveness, where I conclude that if companies really want to be sustainable and profitable they have to apply digital strategies because today that is giving rise to talk because it is a strategy that helps attract more customers. Supporting what was stated by Kotler & Armstrong (2013), which states, in order to implement adequate digital marketing strategies, an in-depth analysis and diagnosis must first be carried out, which determines the strengths and weaknesses that organizations have.

To identify the level of positioning of the organization, a series of strategies were implemented using e-mailing marketing and social media, within the strategies the AIDA methodology was used because it is a flexible tool according to the objectives to be obtained, such as positioning, profitability and sales.

b) Identification of the positioning level of the company after applying the strategy of marketing digital through the post test. Taking into account the post test, it was determined that the recognition of the association rose where 11.3 percent of the respondents are indifferent, while a resounding 88 percent agree with the recognition. On the other hand, it was revealed that 61 percent of the association's clients recognized the logo, while 12 percent felt dissatisfied, this because these companies do not make continuous use of social networks and corporate emails. Regarding the quality service, it was found that 52 percent do recognize that the association provides a quality service, on the other hand, 25 percent state that they disagree with the service provided, while 9 percent give know his indifference to the question. Regarding the current management, it was determined that 45 percent of the partners agree with the current management, on the other hand, 36 percent disagree, while 13 percent are indifferent. Taking into account the study carried out, the present investigation agrees with the thesis raised

by Rojas (2017) because he carried out an analysis after having applied the proposed strategies, where he concluded that in order to be sure of positioning a product or service it is necessary to identify what customers think or value, therefore, to reach the positioning of the company's brand, it is important to consider that the care it provides is of a very good quality of its product or service, since consumers play a role very important when providing us with information and their drawbacks must be improved, positioning the brand positively; According to the authors Kotler & Keller (2008), who argue that a company must necessarily use digital tools to continue in the market, these companies must implement strategies for a public.

Taking into account the pre-test, where the dimensions of the level of guided recall, the attributes associated with the brand and the intention of recommendation were identified, they found a very low level of perception of the different clients, where they mainly disagreed. and totally disagree. All this analysis allowed the researcher to establish strategies that managed to reverse this situation in regards to Association, through the post test used it was observed that most of the clients feel identified with the brand, creating an internal value in each one of them. where the value that prevailed the most was that they agreed and totally agreed with the organization.

c) Design of the digital marketing strategy of the association for the improvement of the positioning of the digital platform. For the design of the digital marketing strategy, the AIDA methodology will be used.

## V. CONCLUSIONS

a) Analyze the positioning of the association before applying the digital marketing strategy through the pre-test . It was determined that the positioning of the association before applying the strategies was negative where 100% of the partners, 42% identify with the association, however, 38% of the respondents state that the positioning strategies are not the adequate, and do not feel identified with the association, while 19% are indifferent regarding the positioning; Having this data, we have proceeded to implement appropriate marketing strategies in order to position the company's brand in the minds of people.

b) Identify the positioning level of the company after applying the digital marketing strategy through the post test.

It was determined that the level of positioning after applying the digital marketing strategies had a positive impact, this is because a resounding 88% agree with

the recognition, also 62% state that the organization offers a quality service. Therefore, it is concluded that the different strategies contribute to the organization value, profitability and loyalty in people and customers. c) It was possible to design the digital marketing strategy of the Association to improve the positioning of the digital platform.

## VI. RECOMMENDATIONS

a) It is recommended to establish which instruments or techniques would be the most appropriate, because these will allow the collection of data that will be very important for the implementation and execution of digital marketing strategies of a certain company.

b) For future research academic, HE recommends have in account the induction that HE you has to toast to the managers either administrative of a organization for No trigger ignorance either obstacles in the execution of the project.

c) If recommends take in account the studies of market either studies of scientific research of the last three years in order to make a correct plan for improve the shortcomings that companies have in study.

## ANNEXES

### → Fiabilidad

#### Escala: ALL VARIABLES

##### Resumen de procesamiento de casos

	N	%
Casos Válido	80	100,0
Excluido <sup>a</sup>	0	,0
Total	80	100,0

a. La eliminación por lista se basa en todas las variables del procedimiento.

##### Estadísticas de fiabilidad

Alfa de Cronbach	N de elementos
,898	15

Interpretation:

For the reliability analysis of the instrument applied after the post test, we proceeded to process the data on a Likert scale of 15 questions, through the SPSS software, where a Cronbach's alpha of 0.898 was obtained, which means that the instrument is accepted. Since the value exceeds 0.8 Cronbach's alpha, it is called "Good".

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# Neuromarketing and Student Loyalty of a Technological Institute in Peru

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## Abstract

The search for strategies that strengthen loyalty has become an aspect of attention for service companies, 80 and 90% of leading companies have loyalty programs that range from traditional coupons, loyalty cards, points and until taking advantage of technologies such as Blockchain, few organizations have truly developed the ability to retain their customers. A Forrester study shows that marketers find it twice as important to retain current customers as it is to win new ones. Incurring the cost of acquiring a customer is only worthwhile when, through future flows, that investment is recovered. So much so that the study of neuromarketing is shown as a science that will help to identify emotions and sensations regarding a company to propose strategies that strengthen customer loyalty. Customer loyalty does not apply to all customers equally. In the case of a bank, maintaining a relationship with a delinquent client that generates losses in the income statement is not very appropriate. For this reason it is essential to segment customers; first for what they are worth to the business and then for their needs and behaviors. In turn, it maintains that loyalty must be taken into account throughout the cycle of managing commercial relations. (Martinez, 2022)

The objective of the study was to determine the incidence of neuromarketing in the loyalty of the students, the type of research is descriptive, the instrument was the questionnaire, a sample of 301

students of the Institute, object of the study, was taken into account.

## Keywords

Loyalty, Neuromarketing, Students

## I. INTRODUCTION

Product and service innovations are copied more and more quickly by competitors, loyalty has allowed companies to improve their income and their network of contacts in order to publicize their business and strengthen the sale of your product or service. There are many resources that these companies use to compete and be able to stay in the market. That is why, to better understand consumer behavior when making purchases, a study of "neuromarketing", a combination of neuroscience and marketing studies, could be one of the options in this globalized world. (Nizam et al., 2022). In the study carried out by Silva (2022), he refers that a quality educational service is important to achieve loyalty in students of Peruvian institutes of higher education, with the purpose that they finish their studies and contribute to the development of the Society, in The research aimed to determine the technical higher educational quality and the relationship it has with the loyalty of the students of the banking school of private institutes of Surco in Peru, in addition the survey technique was used in a group of 129 students whose results They showed that loyalty levels are affected by the dimensions that make up the quality



of the educational service. On the other hand, for the verification of hypotheses, the Pearson Chi Square Test and the Spearman Correlation Test were used, the statistical tests showed a high significant correlation between the quality educational service and student loyalty.

Customer loyalty has become an important concern in organizations globally, which is why neuroscience emerges as a means to know the customer's feelings. The objective is to determine the effect of Neuromarketing on the loyalty of the clients of the company GER'S SNACKS & SHACKES of the city of Cajamarca, the type of research is applied; it has a quantitative scope, the objectives are descriptive, the instruments are the questionnaire and direct observation; using a sample of 272 restaurant customers. After collecting the information, it was processed through a Chi-square statistical test and for the reliability of the questions, a Cronbach's Alpha was performed. The results allowed us to know the current situation of the company, implement neuromarketing in the company GER'S SNACKS & SHACKES and measure customer loyalty after applying neuromarketing. The conclusions obtained were positive where a correct use of neuromarketing was made. (Gutierrez, 2022)

Torres & Jaramillo (2015), in their study, aims to determine the characteristics of relationship marketing as a key factor in the customer loyalty process in the large construction companies of Manizales in Colombia, the study was based on the Lingreen model, where the relationship marketing has to be approached in three objective dimensions, constructs and instruments, the study is based on a mixed qualitative and quantitative approach, the results were based on the study towards the construction companies where it is concluded that the construction companies recognize the satisfaction of their needs, however in the market there are no construction companies that are interested in satisfying their needs.

Well and Saavedra (2022). The methodology used in the study is a systematic review of the literature, for which the query was generated in databases such as Scopus, Proquest, Ebsco and Web of Science, generating the selection of indexed scientific articles that are published on platforms such as Scimago, it is concluded that sensory marketing is important, it refers to the human senses for promotional activities and to generate innovation in their marketing strategies, to retain customers, to stay in the dynamic and challenging emerging markets, involving all the senses and indirectly the attributes. of the product and its characteristics in the subconscious mind of the

consumer.

Neuromarketing is an emerging area of interest for large companies. Companies are investing enormous capital in neuroscientific technologies to understand the impact of branding, advertising and other external stimuli on the human brain and formulating marketing strategies accordingly to influence customer perceptions in the target market. This is creating a need for certified professionals on both the vendor and client sides, such as data analysts, consultants, and managers in neuromarketing. The study is mainly based on the information available online during the times of Covid. (Gupta et al., 2022)

Loyalty is the set of conditions that allow the customer to feel satisfied with the product or service that he requires and this encourages him to buy it again. (Alcaide, 2015), in turn Kotler & Armstrong (2021), argue that loyalty refers to the process of developing and maintaining long-term relationships with customers through the continuous delivery of value and the satisfaction of their needs, with in order to increase customer retention and loyalty.

Meanwhile, Sánchez (2017) refers that customer loyalty generates less marketing expenses. A consumer who has already bought from us already knows our brand and is more likely to buy from us again than a new consumer, and in turn, a regular customer requires fewer operations in the sales process. In addition, Neuromarketing is the union of cognitive psychology, which studies mental processes, neurology and neurophysiology, which study the functioning and responses of the brain and body physiology to external stimuli, and marketing, which studies the exchanges valuable, to explain the effects of marketing on the behaviors and purchasing and decision processes of customers and consumers. (Royo & Varga, 2022).

## II. TYPE, DESIGN AND METHOD OF RESEARCH

### Study type

The type of research was descriptive, with a mixed approach.

### Study design

The design that was proposed was non-experimental, cross-sectional.

### Goals

General

Propose a neuromarketing strategy for the loyalty of the students of the Institute.

Specific

Analyze the loyalty for the customer value dimension of the students of the Technological Institute.

Analyze the loyalty for the relational Marketing dimension of the students of the Technological Institute. Analyze the loyalty for the internal Marketing dimension of the students of the Technological Institute. Design the olfactory sensory marketing strategy for the loyalty of the Institute's students.

#### Study variables

##### Dependent variable:

##### Loyalty

Loyalty refers to the process of developing and maintaining long-term relationships with customers through the continuous delivery of value and the satisfaction of their needs, in order to increase customer retention and loyalty (Kotler & Armstrong, 2021).

##### Independent variable:

##### Neuromarketing

Neuromarketing is the union of cognitive psychology, which studies mental processes, neurology and neurophysiology, which study the functioning and responses of the brain and body physiology to external stimuli, and marketing, which studies valuable exchanges, to explain the effects of marketing on the behaviors and purchasing and decision processes of customers and consumers. (Royo & Varga, 2022).

##### Population and sample

##### Population

The size of the population 1400 students, distributed in technical careers and continuing education courses.

Careers	No. students
Technical Careers	960
Continuous training	440
<b>Total</b>	<b>1400</b>

Note: Total number of students enrolled in the year 2021.

##### Sample

Palella and Martins (2012), refer to the sample size of a study it is important to take into account the population variance (population heterogeneity), two other factors that are the level of confidence and the maximum error allowed in the estimates (sampling error). )" (p.108).

##### Inclusion and exclusion criteria

Inclusion criteria: Students enrolled in technical careers. Exclusion criteria: Students of continuing education courses.

Taking into account the established, the sample was found.

Where:

N = population size

n= It is the sample size of the population or universe (total number of possible respondents)

Z= Confidence level

p= Probability of success, or expected proportion

q= Probability of failure

E= Maximum acceptability of error between the real proportion and the sample proportion.

Data:

n= Number of students.

Z= 1.96 with a confidence level of 95%

p= Probability in favor 50%

q= Probability against 50%

E= Error of 5%

$$n = \frac{Z^2 pq N}{E^2 (N - 1) + Z^2 pq}$$

Taking into account the indicated data, the calculation was established, where the sample obtained was m=301.

#### Data collection techniques and instruments, validity and reliability

##### Techniques

The technique used to measure the dependent variable loyalty was the survey.

##### Validation and reliability

To assess the reliability of the instrument (questionnaire), the CronBach Alpha statistical technique was applied.

##### Data analysis methods

For data processing, the statistical program the Statistical Package for the Social Sciences, known by its acronym SPSS, was used. As well as the MS Excel spreadsheet for a better presentation of the results in tables and graphs.

#### III. RESULTS

The results were important findings for the present study, for which the authors carried out the analysis of the results by dimensions and indicators, according to what was obtained:

##### Dimension: Customer Value

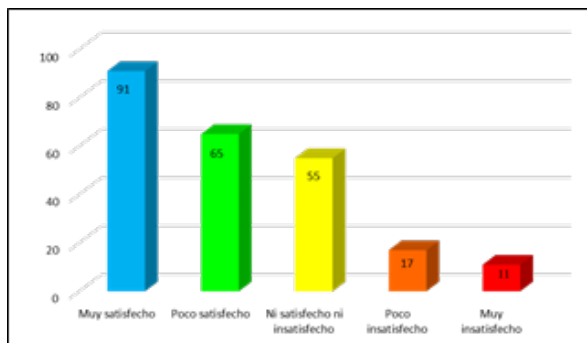
##### Indicator: Satisfaction

Table 1: The institute offers a differentiated service.

valid s	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	91	35.8	38.1	38.1
little satisfied	65	25.6	27.2	65.3
neither satisfied nor dissatisfied	55	21.7	23.0	88.3
little dissatisfied	17	6.7	7.1	95.4
Very unsatisfied	eleven	4.3	4.6	100.0
<b>Total</b>	<b>239</b>	<b>94.1</b>	<b>100.0</b>	

Note: Questionnaire database.





**Figure 1: Differentiated service.**

Note: The figure shows that 91 students are very satisfied with the differentiated service offered by the institute, on the contrary, 11 students are very dissatisfied with the service provided. This implies that the institution is developing a culture of adequate customer service in order to meet the needs and demands of students.

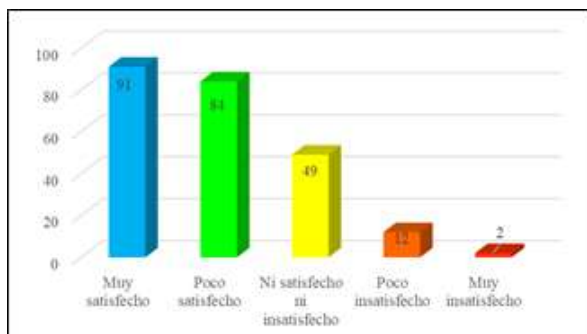
Source: Table 1

#### Indicator: Loyalty

**Table 2: Would you recommend a friend or family member to study at the institution?**

valid	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	91	35.8	38.2	38.2
little satisfied	84	33.1	35.3	73.5
neither satisfied nor dissatisfied	49	19.3	20.6	94.1
little dissatisfied	12	4.7	5.0	99.2
Very unsatisfied	2	.8	.8	100.0
Total	238	93.7	100.0	

Note: Base of data of the questionnaire.



**Figure 2: loyalty measurement**

Note: The figure shows that of the total number of respondents, 91% are very satisfied when recommending the institute and 2% would not recommend it, therefore, a high percentage agrees with recommending a family member or friend, demonstrating the brand loyalty of the institution.

Source: Table 2

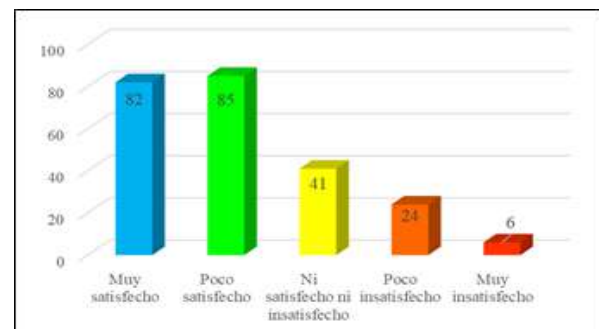
#### Dimension: Relationship Marketing

##### Indicator: Feedback

**Table 3: Monitoring of payments and notes in the institution**

valid	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	82	32.3	34.5	34.5
little satisfied	85	33.5	35.7	70.2
neither satisfied nor dissatisfied	41	16.1	17.2	87.4
little dissatisfied	24	9.4	10.1	97.5
Very unsatisfied	6	2.4	2.5	100.0
Total	238	93.7	100.0	

Note: Questionnaire database.



**Figure 3: Tracking payments and notes.**

Note: The figure shows that 82% of the total respondents are very satisfied with the follow-up they receive on their payments and notes; 85% are not very satisfied and 6% are very dissatisfied. Therefore, a large percentage of those surveyed feel comfortable with the monitoring of their payment schedules and the score in their notes.

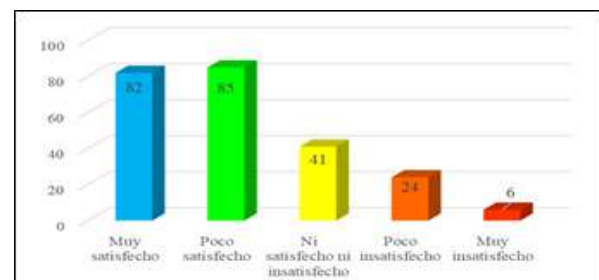
Source: Table 3.

#### Indicator: Personalized attention

**Table 4: The attention received is fast.**

valid	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	73	28.7	30.9	30.9
little satisfied	69	27.2	29.2	60.2
neither satisfied nor dissatisfied	44	17.3	18.6	78.8
little dissatisfied	29	11.4	12.3	91.1
Very unsatisfied	twenty-one	8.3	8.9	100.0
Total	236	92.9	100.0	

Note: Base of data of the questionnaire.



**Figure 4: Total valuation of attributes related to the brand**

Note: Figure 4 shows that 73% of those surveyed are very satisfied with the care, 44% are neither satisfied nor dissatisfied, and a reduced 21% are very dissatisfied. Therefore, it is specified that there is rapid attention to a possible problem, which is highly regarded by students, however, customer service activities must still be strengthened in order to reinforce student loyalty.

#### Indicator: Commitment

Valid	Frequency	%	% valid	% accumulated
Very satisfied	63	24.8	26.4	26.4
little satisfied	52	20.5	21.8	48.1
neither satisfied nor dissatisfied	77	30.3	32.2	80.3
little dissatisfied	30	11.8	12.6	92.9
Very unsatisfied	17	6.7	7.1	100.0
Total	239	94.1	100.0	

Note: Base of data of the questionnaire.

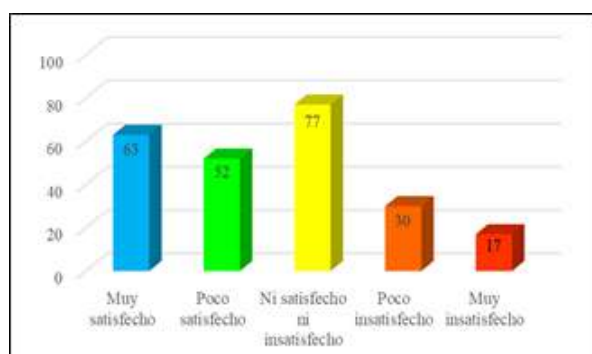


Figure 5: Commitment to the student

Note:

In the figure it can be seen that a high percentage of respondents are neither satisfied nor dissatisfied with the information received from the workshops and training provided by the institution, which implies that it is an aspect that must be improved in order to have satisfied customers.

#### Dimension: Internal Marketing

##### Indicator: Effective communication

Table 6: A suitable work environment is perceived

valid	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	93	36.6	38.6	38.6
little satisfied	86	33.9	35.7	74.3
neither satisfied nor dissatisfied	33	13.0	13.7	88.0
little dissatisfied	twenty	7.9	8.3	96.3
Very unsatisfied	9	3.5	3.7	100.0
Total	241	94.9	100.0	

Note: Questionnaire database.

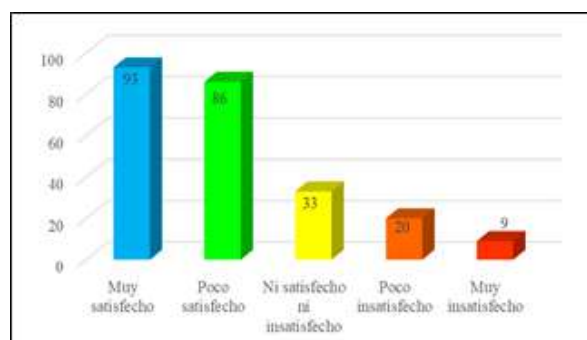


Figure 6: Work Environment

Note: According to the data found, 93% of the respondents have a positive perception of the work environment among the workers, 86% of the respondents are not very satisfied and a small number of 9% are very dissatisfied. Where students recognize that the work environment among workers is positive and friendly, which creates great trust and perceived respect in the work environment.

Table 7: The institute is synonymous with technology and innovation

valid	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	88	34.6	37.0	37.0
little satisfied	94	37.0	39.5	76.5
neither satisfied nor dissatisfied	24	9.4	10.1	86.6
little dissatisfied	22	8.7	9.2	95.8
Very unsatisfied	10	3.9	4.2	100.0
Total	238	93.7	100.0	

Note: Questionnaire database.

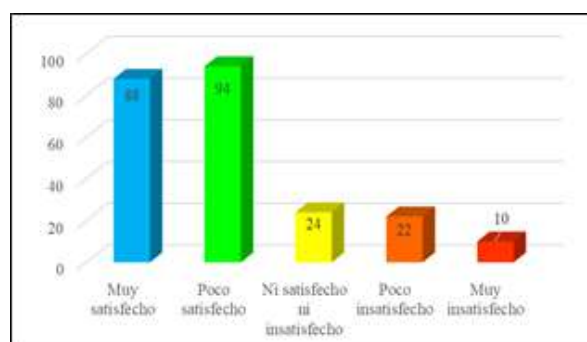


Figure 7: Synonymous with technology and innovation

Note: the figure shows that 94% of those surveyed are not very satisfied, 88% are very satisfied and 10% are very dissatisfied in terms of the institution being synonymous with technology and innovation. While there is a high degree of perception regarding the institution as a modern company that makes use of technological products according to the market and the needs of students and their technological careers.

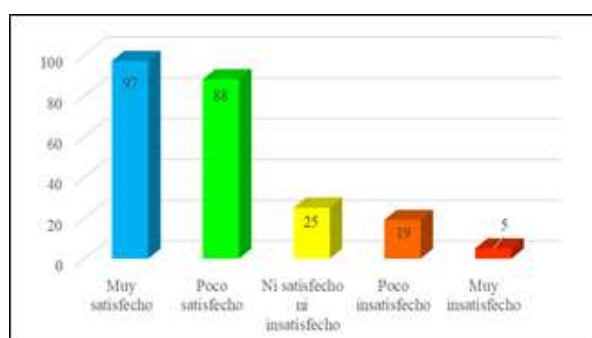
## Dimension: Neuromarketing

### Indicator: Emotions

**Table 8: The use of technological tools was a reason for choosing your career**

	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	97	38.2	41.5	41.5
little satisfied	88	34.6	37.6	79.1
neither satisfied nor dissatisfied	25	9.8	10.7	89.7
little dissatisfied	19	7.5	8.1	97.9
Very unsatisfied	5	2.0	2.1	100.0
Total	234	92.1	100.0	

Note: Base of data of the questionnaire.



**Figure 8: Reason for choosing a professional career**

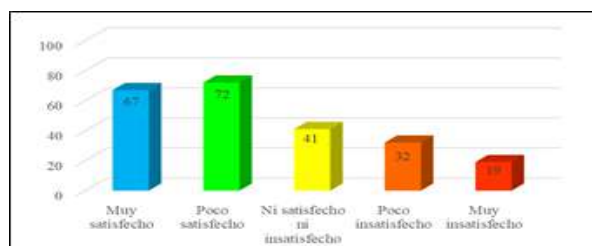
Note: According to Table 8, 97% of those surveyed are very satisfied, 88% are not very satisfied and, on the contrary, a reduced 5% are very dissatisfied because the use of technological tools was the reason for choosing a professional career. Meanwhile, a part of those surveyed felt influenced by the technological products offered by the Institute when choosing a technical career.

### Indicator: Product/service characteristics

**Table 9: Benefits provided at the institution**

	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	67	26.4	29.0	29.0
little satisfied	72	28.3	31.2	60.2
neither satisfied nor dissatisfied	41	16.1	17.7	77.9
little dissatisfied	32	12.6	13.9	91.8
Very unsatisfied	19	7.5	8.2	100.0
Total	231	90.9	100.0	

Note: Base of data of the questionnaire.



**Figure 9: Acceptance of benefits.**

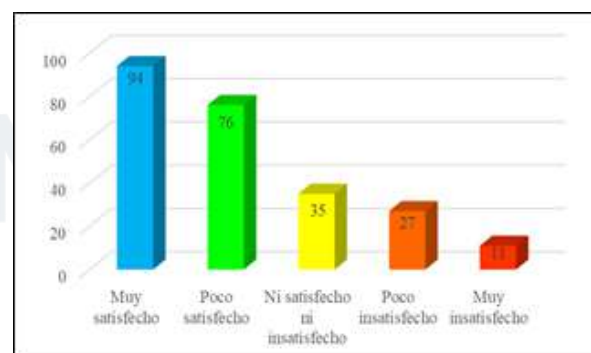
Note: According to the results obtained, 67% are very satisfied, 72% are somewhat satisfied, 41% are neither satisfied nor dissatisfied, and a small percentage of 19% is very dissatisfied with respect to the benefits provided by the institute. Thus, the institution offers an important aspect to the students, which correspond to the promotions and discounts packages, because you always have to be vigilant and inform about the different benefits of belonging to the institution.

### Indicator: Perception

**Table 10: Iconic colors are attractive**

	Frequency	Percentage	Valid percentage	Accumulated percentage
Very satisfied	94	37.0	38.7	38.7
little satisfied	76	29.9	31.3	70.0
neither satisfied nor dissatisfied	35	13.8	14.4	84.4
little dissatisfied	27	10.6	11.1	95.5
Very unsatisfied	eleven	4.3	4.5	100.0
Total	243	95.7	100.0	

Note: Base of data of the questionnaire



**Figure 10: Acceptance of institutional colors.**

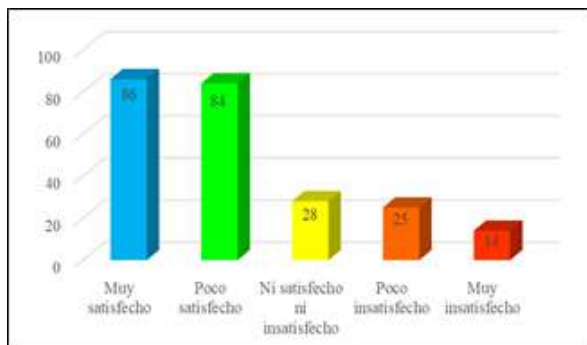
Note: Figure 10 shows that 94% of respondents feel very satisfied, 35% neither satisfied nor dissatisfied in terms of attraction to the institutional colors of the institution. Thus, the colors of the institution create a pleasant and trustworthy feeling with the clients – students. The institute's policy is to provide creative environments where students feel identified with colors. It is important to keep in mind that the right colors create trust environments in organizations.

### Indicator: Experience

**Table 11: Technical race qualification**

	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	86	33.9	36.3	36.3
little satisfied	84	33.1	35.4	71.7
neither satisfied nor dissatisfied	28	11.0	11.8	83.5
little dissatisfied	25	9.8	10.5	94.1
Very unsatisfied	14	5.5	5.9	100.0
Total	237	93.3	100.0	

Note: Base of data of the questionnaire.



**Figure 11: Qualification of the technical race.**

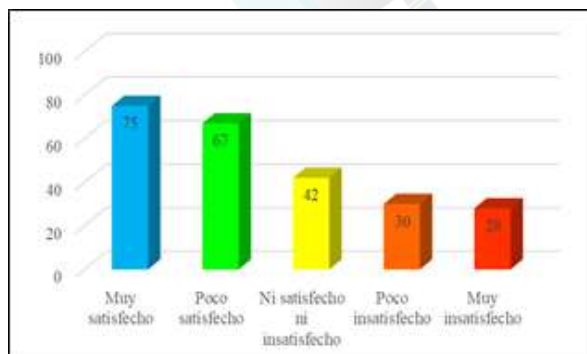
Note: The figure shows that 86% of those surveyed are very satisfied with the chosen technical career, 84% are not very satisfied. Meanwhile, the students surveyed maintain that their expectations are met, which is very favorable for the institution since it helps to build a better position against its competitors.

#### Indicator: Influence of the environment

**Table 12: The environments are suitable**

	Frequency	Percentage	valid percentage	Accumulated percentage
Very satisfied	75	29.5	31.0	31.0
little satisfied	67	26.4	27.7	58.7
neither satisfied nor dissatisfied	42	16.5	17.4	76.0
little dissatisfied	30	11.8	12.4	88.4
Very unsatisfied	28	11.0	11.6	100.0
Total	242	95.3	100.0	

Note: Base of data of the questionnaire.



**Figure 12: Influence of the environment on the enrollment decision.**

Note: According to the results in Table 12, it is shown that 75% of the respondents are very satisfied, 42% are neither satisfied nor dissatisfied, and 28% are very dissatisfied with the enrollment decision, influenced by knowing the environments of the institute. .

## IV. CONCLUSIONS

It was possible to analyze the loyalty for the customer value dimension of the students of the Technological Institute, having obtained 91% of the respondents very

satisfied, which implies that the institution is developing a culture of adequate customer service in order to satisfy the needs and demands of the students.

It was possible to analyze the loyalty for the relational Marketing dimension of the students of the Technological Institute, analyzing the feedback indicators with 82% of being satisfied and 73% of the respondents being very satisfied with the personalized attention.

It was possible to analyze the loyalty for the internal Marketing dimension of the students of the Technological Institute.

It was possible to design the olfactory sensory marketing strategy for the loyalty of the Institute's students.

## ANNEXES

### Appendix 1.

#### Olfactory sensory marketing strategy plan Foundation

The strategy is based on the theoretical contribution made by the marketing specialist and representative in Peru of the Neuromarketing World Forum, Liliana Alvarado, who is currently the academic director of Marketing at the Peruvian University of Applied Sciences.

According to Alvarado (2013), he refers to olfactory marketing, which aims to make the act of purchase become a moment of comfort and sensory pleasure for the customer, supporting positive emotions, making them enjoy the shopping experience so that it is satisfactory. Stimulating the sense of smell is a differentiation factor, it provokes surprise and develops a better image of the brand, generating a positive memory of it". Alvarado (2013)

In this strategy we want to implement the development of an aroma that can generate a stimulus in one of the most important senses of the person, which is smell; with this it will be possible to stimulate a part of the brain that will generate a pleasant memory.

#### Strategy Goal

Contribute to the knowledge of olfactory marketing by analyzing through the exposure of a fragrance in the institute's environments, with the main objective of developing a fragrance, which is easy to identify and thereby attract and attract new customers (students). Goals

- Recognize the brand by smell.
- Contribute sensations and experiences.
- Foster emotional bond with the brand.
- Evaluate the perception of the olfactory sensory experience.

## Development

### Aromatize the point of sale

Select the areas where there is a flow of customers (Reports Area, Student Service – SAE and laboratories). Select the fragrance that suits the personality and corporate image of the brand.

### Criteria for choosing the aroma

Citrus aromas: help increase sales among the youngest, since they generate some anxiety and the need to buy impulsively and irrationally. Sandalwood aromas: provide sensations of tranquility and protection.

Vanilla aroma: it is the natural component closest to the taste of breast milk. It generates confidence and protection in all people, evokes childhood memories.

Sabilla Aroma: sensation of serenity and sweetness.

Juniper aroma: ideal if you want the public to stay for long periods of time in your business. Wood and leather aroma: Sensations of stability, its use is preferable for businesses that offer products and services to adults.

### Company specializing in sensory marketing aromatika

We are the pioneer company of sensory marketing in Peru.

We study, develop and apply aromas that help to achieve a unique experience associated with your company, brand or product, creating your own signature, which, complemented with adequate ambient music, creates positive impressions on your customers and related to your brand image, improving the experience and thus increasing the time they remain in your business, contributing to their positioning and increasing their sales.

### Construction of the practical contribution

#### Goals

1. Verify that the statements of the olfactory stimuli improve the predisposition of clients when obtaining a service within the institute's facilities.
2. Improve the sensory experience of customers and potential customers.
3. Strengthen brand recall through olfactory stimulation.
4. Develop loyalty between students and the brand.

### Stages and phases:

#### Activity 1

#### Exposure to the management of the creation of an Odotype.

#### Description:

-Exposition of the budget and the importance of the creation of a business odotype, along with this, the company that will be in charge of carrying out the odotype will be announced.

-The definition and characteristics of having an odotype (particular smell) will be explained and why

it is important that the institution values and feels identified with this smell.

#### Duration

- Interview with the manager 1 hour.

#### Activity 2

#### Induction process.

#### Description:

- To make known through training to all areas of the Institution the importance that this would have in front of the student and potential clients.

#### Duration

- The staff induction process will last 2 hours.

#### Activity 3

Presentation and exhibition of the Odotype.

#### Description:

- Within activity 2 (Induction Process) the chosen aroma that will represent the Institute will also be exposed.

The benefits and the contribution that the aroma will make to its consumers will be detailed.

There will also be an observable analysis of the reaction of the guests to the aroma to know its acceptance; Suggestions and opinions will be taken into account.

#### Duration

- The presentation and exhibition of the Odotype will be 1 hour

#### Activity 4

#### Focus Group.

#### Description:

- The invitation is made to all the delegates of the races through their email accounts so that they can participate in a focus group.

#### Duration

- The focus group will last 1 hour.

#### activity 5

Survey application.

#### Description:

- Within the development of activity 4 (focus group) a survey will be applied with specific questions about the aroma.

#### Duration

- It will last 1 hour.



## APPENDIX 2

### Operationalization of variables

Variable(s)	concept definition	operational definition	Dimensions	Indicators	measurement scale
Dependent Variable: LOYALTY	Loyalty refers to the process of developing and maintaining long-term relationships with customers through the continuous delivery of value and satisfaction of their needs, in order to increase customer retention and loyalty. (Kotler & Armstrong, 2021)	Loyalty is made up of 4 dimensions: customer value, relationship marketing, multichannel communication and internal marketing.	customer value	Satisfaction	Likert
				Loyalty	
			Relational marketing	Feedback	
				personalized attention	
			internal marketing	Commitment	
				Effective communication	
Independent variable: neuromarketing	Neuromarketing studies brain processes that explain people's behavior and decision-making. Braidot (2017)	Neuromarketing is made up of 2 dimensions Sensory Neuromarketing, consumer behavior.	sensory neuromarketing	stimuli	Ratio/Proportion
				Emotions	
			Consumer behavior	Product/service features	
				Perception	
				Experience	
				Environment Influence	

Source: self-made.





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